

SFUND RECORDS CTR
2056494

**SUPERFUND
RECORD OF DECISION
FINAL**

LANDFILL OPERABLE UNIT SITES

**MATHER AIR FORCE BASE
SACRAMENTO COUNTY, CALIFORNIA**

July 1995

00078

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List of Acronyms

AC&W	Aircraft Control and Warning
AFB	Air Force Base
ARAR	Applicable or Relevant and Appropriate Requirement
BACT	Best Available Control Technology
BCRA	Base Closure and Realignment Act
CCR	California Code of Regulations
CERCLA	Comprehensive Environmental Response, Compensation, and Liability Act of 1980
COPC	Chemicals of Potential Concern
CFR	Code of Federal Regulations
CSF	cancer slope factor
CVRWQCB	Central Valley Region Water Quality Control Board
CW	gas characterization well
DCA	dichloroethane
DCB	dichlorobenzene
DCE	dichloroethylene
DCP	dichloropropane
DDD	dichlorodiphenyldichloroethane
DDE	dichlorodiphenyldichloroethylene
DDT	dichlorodiphenyltrichloroethane
DLM	Designated Level Methodology
DFG	Department of Fish and Game
DSB	deep soil boring
DTSC	Department of Toxic Substances Control
ECR	excess cancer risk
EPA	Environmental Protection Agency
FEMA	Federal Emergency Management Agency
FFA	Federal Facility Agreement
FFS	Focused Feasibility Study
HEAST	Health Effects Assessment Summary Tables
HI	Hazard Index
HQ	Hazard Quotient
IRP	Installation Restoration Program
IRIS	Integrated Risk Information System

List of Acronyms (Continued)

IWMB	Integrated Waste Management Board
LOAEL	Lowest-Observable-Adverse-Effect-Level
IMCB	monochlorobenzene
MCL	Maximum Contaminant Level
MCLG	Maximum Contaminant Level Goal
MSWLF	Municipal Solid Waste Landfill
MW	gas migration well
NCP	National Pollution Contingency Plan
NOAEL	No-Observed-Adverse-Effect-Level
NPL	National Priorities List
O&M	Operation and Maintenance
OU	operable unit
PAH	polyaromatic hydrocarbon
PCB	polychlorinated biphenyls
PCE	tetrachloroethylene
PDI	preliminary design investigation
PM10	particulate matter less than 10 microns in size
POL	petroleum, oil and lubricant
POTW	Publicly Owned Treatment Works
PRP	principal responsible party
RfD	reference dose
RI	remedial investigation
ROC	reactive organic chemicals
ROD	Record of Decision
RWQCB	Regional Water Quality Control Board
SAC	Strategic Air Command
SARA	Superfund Amendments Reauthorization Act of 1986
SDWA	Safe Drinking Water Act
SMAQMD	Sacramento Metropolitan Air Quality Management District
STLC	Soluble Threshold Limit Concentration
SWAT	Solid Waste Assessment Test
SWRCB	State Water Resources Control Board
TBC	To-Be-Considered
TCA	trichloroethane

List of Acronyms (Continued)

TCE	trichloroethylene
THC	total hydrocarbon content
TTLC	total threshold limit concentration
TPH	total petroleum hydrocarbon
UCL	upper confidence level
U.S.	United States
USAF	United States Air Force
VOC	volatile organic compound
WET	Waste Extraction Test

1.0 Declaration

Statutory Preference for Treatment as a
Principal Element is Not Met
and a Five-year Review is Required

1.1 Site Name and Location

Landfill Operable Unit (OU) Sites
Mather Air Force Base (AFB),
Sacramento County, California

1.2 Statement of Basis and Purpose

This decision document presents the selected remedial actions for the Landfill OU Sites, at the inactive Mather AFB, Sacramento County, California. The selected remedial actions were developed in accordance with the Comprehensive Environmental Response, Compensation, and Liability Act of 1980 (CERCLA), as amended by the Superfund Amendments Reauthorization Act of 1986 (SARA) and, to the extent practicable, the National Oil and Hazardous Substance Pollution Contingency Plan (NCP). The Installation Restoration Program (IRP) sites which comprise the Landfill OU at the inactive Mather AFB include: Site 1 - Runway Overrun Landfill; Site 2 - "8150" Area Landfill; Site 3 - Northeast Perimeter Landfill No. 1; Site 4 - Northeast Perimeter Landfill No. 2; Site 5 - Northeast Perimeter Landfill No. 3; and Site 6 - Firing Range Landfill Sites. This decision is based on the Administrative Record for these sites. The content of this Record of Decision (ROD) is based on recommendations in the Environmental Protection Agency's (EPA) Interim Final Guidance on Preparing Superfund Decision Documents [EPA 1989a]. The Administrative Record Index (Appendix A) identifies documents that were considered or relied upon to make these decisions.

The purpose of this ROD is to set forth the remedial actions to be conducted at the Landfill OU Sites to eliminate contact with the landfill contents and comply with regulations governing the closure of landfills.

The United States (U.S.) EPA Region IX and the State of California concur with the following selected remedial alternatives:

- Site 1: Alternative 1.1 - No-Action
- Site 2: Alternative 2.2 - Capping (Vegetative Cover)
- Site 3: Alternative 3.2 - Capping (Engineered Cap)
- Site 4: Alternative 4.2 - Capping (Engineered Cap) and Embankment
- Site 5: Alternative 5.2 - Excavation and Consolidation
- Site 6: Alternative 6.3 - Excavation and Consolidation.

This ROD reflects substantial disagreement between the U.S. Air Force (USAF), the U.S. EPA, and the State regarding the applicability of State environmental requirements. However, the State has determined that the proposed actions will comply with the substance of those requirements. Therefore, in the interest of promoting expedient remediation and reuse, the State has not disputed this ROD.

1.3 Assessment of the Site

Contamination exists at the Landfill OU sites as a result of past Air Force operations conducted between 1918 and 1974. The landfills were mainly used for the disposal of general and sanitary refuse. In addition to garbage and household trash, it was reported that petroleum, oil, and lubricant (POL) wastes, as well as waste solvents, primarily trichloroethylene (TCE), may have been disposed in the landfills. It has also been reported that daily burning of the refuse occurred at two of the landfills (Sites 3 and 4).

A brief description of each of the Landfill OU sites is provided in the following sections.

1.3.1 Site 1: Runway Overrun Landfill

Site 1 is located southeast of the formerly active Main Base Area and is partially covered by the overrun of Runway 22R. The site was the original Base landfill and received general refuse from Base operations prior to 1942. Records are not available describing the materials buried at this site. No evidence of refuse has been found during previous investigations. Therefore, it appears that all refuse was removed from Site 1 during the construction of the runway overrun in the 1950s.

Investigations at Site 1 consisted of landfill gas characterization and monitoring, geophysical surveying, soil sampling, and groundwater monitoring. Table 2.1 presents a

chronologic summary of the investigation results. Two landfill gas characterization wells (CW) (CW-2 and CW-3) and five gas migration wells (MW) (MW-4 through MW-8) were installed and sampled. Methane was not detected in either CW, but hydrocarbons were found in the MWs. No refuse or debris were encountered in the CWs drilled in the suspected landfill trench location or perimeter MWs.

Five deep soil borings (DSB) (DSB-T-1A through DSB-T-1E) were drilled and sampled. Diesel, oil and grease, and methylene chloride were detected. Inorganics were detected below total threshold limit concentrations (TTLIC).

Two shallow groundwater wells, i.e., MAFB-14 and MAFB-15 were installed and sampled. Dichloroethylene (DCE), TCE, tetrachloroethylene (PCE), and 1,2-dichloropropane (DCP) were detected. Wells MAFB-14 and 15 were abandoned and replaced with Well MAFB-125. Additionally, Wells MAFB-115 and 126 were installed. Four quarters (1991) of sampling for Solid Waste Assessment Test (SWAT) metals and volatile organic compounds (VOC) was conducted in Wells MAFB-115, 125, and 126. Tetrachloroethylene (PCE), TCE, and DCE were detected.

Since no refuse or contaminants were found at Site 1 in the subsurface soils, no potential source for contamination exists. Therefore, there is no threat to public health, welfare, or the environment.

1.3.2 Site 2: "8150" Area Landfill

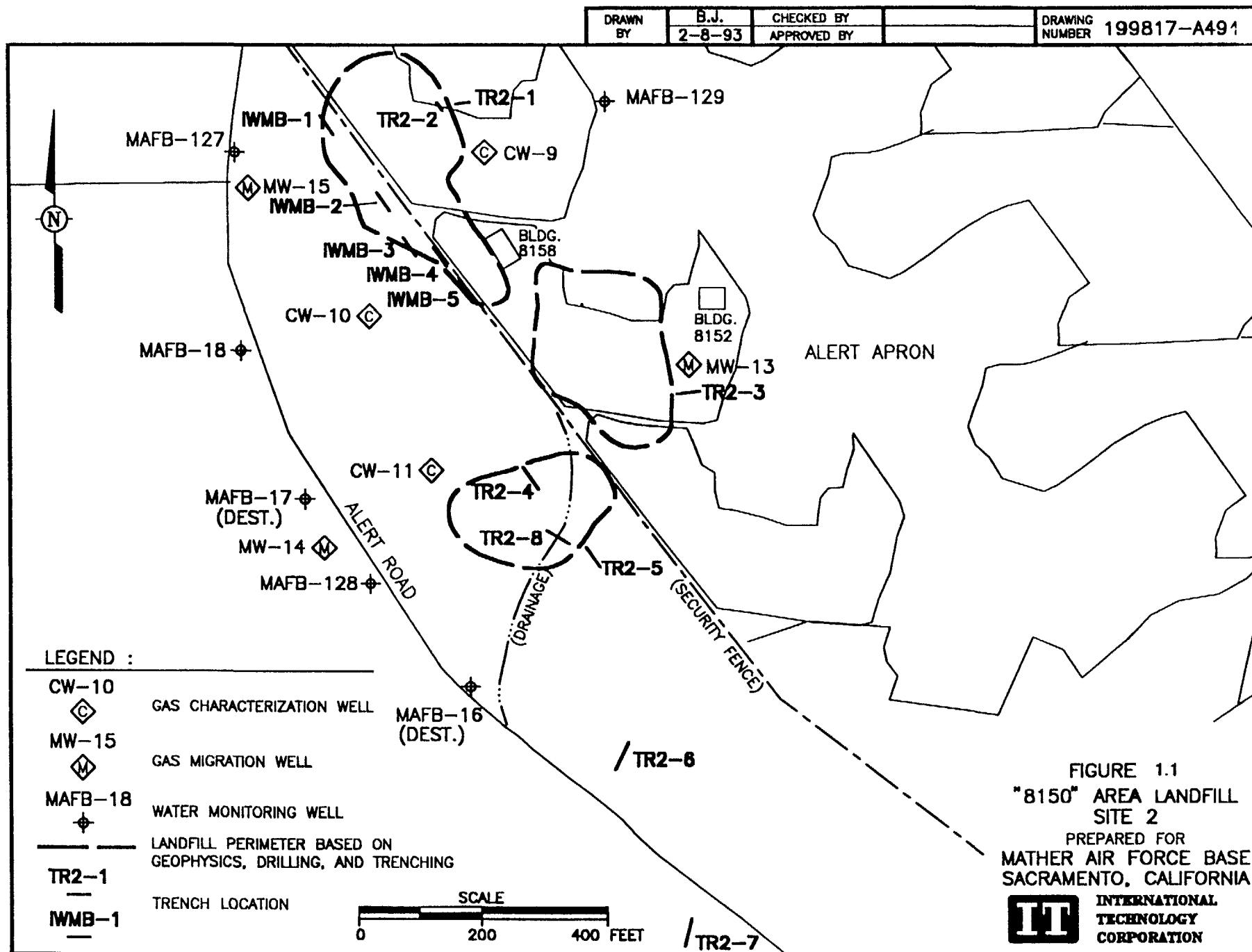
Site 2 is located northwest of the Aircraft Control and Warning (AC&W) OU Site Area and is partially covered by the now inactive Strategic Air Command (SAC) alert apron (see Figure 1.1). The site was the main sanitary landfill for the Base from 1942 to 1950. Limited information is available concerning past operations conducted at the landfill. However, common practice of this era would suggest that some POL wastes may have been disposed with the refuse.

Investigations at Site 2 consisted of landfill gas characterization and monitoring, geophysical surveying, soil sampling and trenching, and groundwater monitoring. Table 2.2 presents a chronologic summary of the investigation results. Three landfill CWs (CW-9 through CW-11) and four landfill MWs (MW-12 through MW-15) were installed and sampled. In Wells CW-9 and CW-11 carbon dioxide and methane were not detected. Detected compounds were trichloromethane, carbon tetrachloride, 1,1,1-

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trichloroethane (TCA), TCE, and PCE. A vapor sample could not be collected from Well CW-10 because the well contained water. Migration well samples were analyzed only for total hydrocarbon content (THC); Wells MW-12, MW-13, MW-14, and MW-15 contained THC. No refuse or debris was encountered. Original landfill gas migration wells (MW-12 through MW-15) were later resampled for methane; methane was detected in Well MW-12.

Five deep soil borings (DSB-A-2A through DSB-A-2E) were drilled and sampled. 1,4-dichlorobenzene (DCB), diesel, and total oil and grease were detected. All detected inorganics were below TTLs. The presence of refuse (mainly glass, bottles, and metal debris) was confirmed in three of five trenches (IWMB-1, 4, and 5 of IWMB-1 through IWMB-5) excavated by the Base Civil Engineering in coordination with the Integrated Waste Management Board (IWMB). Eight additional trenches (TR2-1 through TR2-8) were excavated to assess the lateral extent of refuse in the landfills. Trenches TR2-4 and TR2-8 encountered refuse. Trench TR2-4 showed evidence of burned refuse.

Three shallow wells were installed and sampled (MAFB-16, MAFB-17, MAFB-18). No significant levels of VOCs were detected. Total oil and grease and lead were detected. Well MAFB-16 was not redeveloped or sampled due to well damage. No significant levels of contamination were detected in Wells MAFB-17 or -18. Wells MAFB-16 and MAFB-17 were abandoned and replaced with MAFB-127 and 128. Groundwater was sampled from one landfill CW, Well CW-10. Only total lead was detected. Initial/first, second, and third quarter 1991 sampling of Wells MAFB-127, 128, and 129 detected total lead. No other constituents were detected. Well MAFB-129 was installed for the SWAT monitoring network. Four quarters (1991) of sampling for SWAT metals and VOCs was conducted in Wells MAFB-18, 127, 128, and 129. All values detected were below established Soluble Threshold Limit Concentrations (STLC) and maximum contaminant levels (MCL). No pesticides or polychlorinated biphenyls (PCB) were detected.

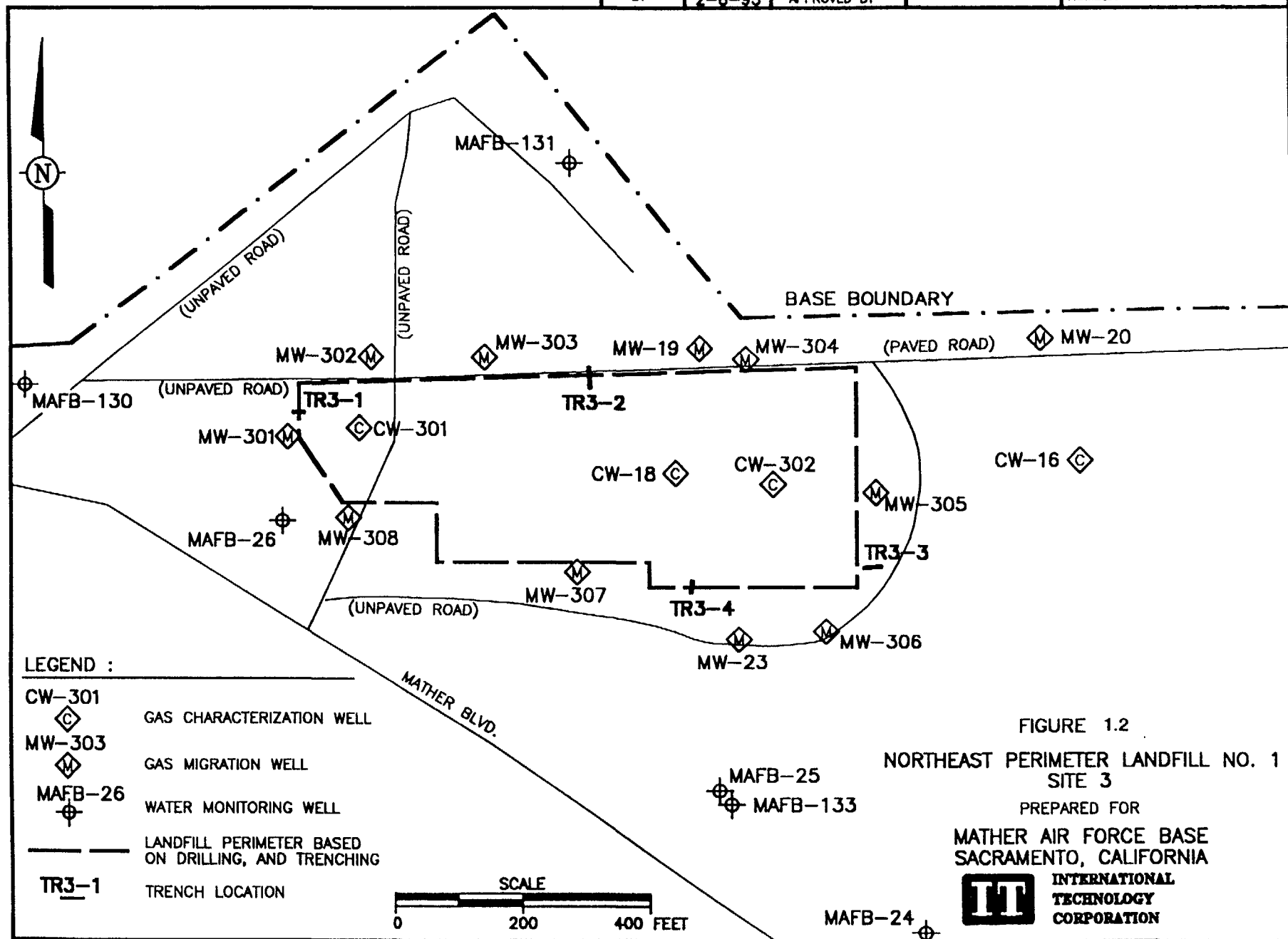
Actual or threatened releases of hazardous substances from Site 2, if not addressed by implementing the response actions selected in this ROD, may present a current or potential threat to public health, welfare, or the environment.

1.3.3 Site 3: Northeast Perimeter Landfill No. 1

Site 3 is located in the northeast corner of the now inactive Base (see Figure 1.2). Site 3 was the main sanitary landfill for the Base from 1950 through 1967. Refuse was

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1-6



MA-L1S3R(MA1B3)

reportedly placed in trenches, burned, and covered daily. The backfilled trenches are discernable at the surface of the site where settlement of the refuse and surface cover cracking has occurred. In addition to refuse, the following items were also reportedly disposed at this site: drummed POL wastes; hospital wastes; waste paint and thinners; and empty pesticide containers.

Investigations at Site 3 consisted of landfill gas characterization and monitoring, geophysical surveying, soil sampling and trenching, and groundwater monitoring. Table 2.3 presents a chronologic summary of the investigation results. Three CWs (CW-16, 17, and 18) and four MWs (MW-19, 20, 22, and 23) were installed and sampled. Hydrocarbons as THC, vinyl chloride, TCE, and PCE were detected. Methane was not detected in any of the perimeter MWs. Methane and refuse were detected in Well CW-18. Additionally, two CWs (CW-301 and 302) and eight MWs (MW-301 through MW-308) were installed and sampled for methane; Wells CW-18 and MW-19 were resampled for methane. None of the perimeter MWs detected methane. Methane was detected in both Wells CW-301 and CW-302.

Ten DSBs (DSB-A-3A through 3J) were drilled and sampled. Trichlorofluoromethane, diesel, methylene chloride, and oil and grease were detected. Detected inorganic constituents were below TTLCs. Four surface soil samples (SS-3A to SS-3D) were collected and sampled. Toluene, xylene, oil and grease, diesel, acenaphthene, anthracene, benzo(a)pyrene, pyrene, phenanthrene, benzo(a)anthracene, benzo(b)fluoranthene, benzo(g,h,i)perylene, benzo(k)fluoranthene, chrysene, fluoranthene, ideno(1,2,3-cd)pyrene, and acenaphthylene were detected. All detected inorganics were below TTLCs. Nine soil samples were collected during drilling of the CWs and analyzed for geotechnical parameters. Additionally, three surface bulk samples were collected for geotechnical analyses. Four trenches (TR3-1 through TR3-4) were excavated to assess the lateral extent of refuse in the landfills. All four trenches encountered refuse with little or no evidence of burning.

Groundwater monitoring wells MAFB-24, 25, and 26 were installed and sampled. Dichloroethylene, TCE, and 1,2-DCP were detected in Well MAFB-26. No significant levels of contamination were detected in Wells MAFB-24 or 25. Wells MAFB-111, 112, 130, 131, 132, and 133 were installed and sampled. Trichloroethylene, PCE, and DCE were detected. A perched water sample from Well CW-301 was collected and analyzed. Vinyl chloride, DCE, and DCB were detected.

Actual or threatened releases of hazardous substances from Site 3, if not addressed by implementing the response actions selected in this ROD, may present a current or potential threat to public health, welfare, or the environment.

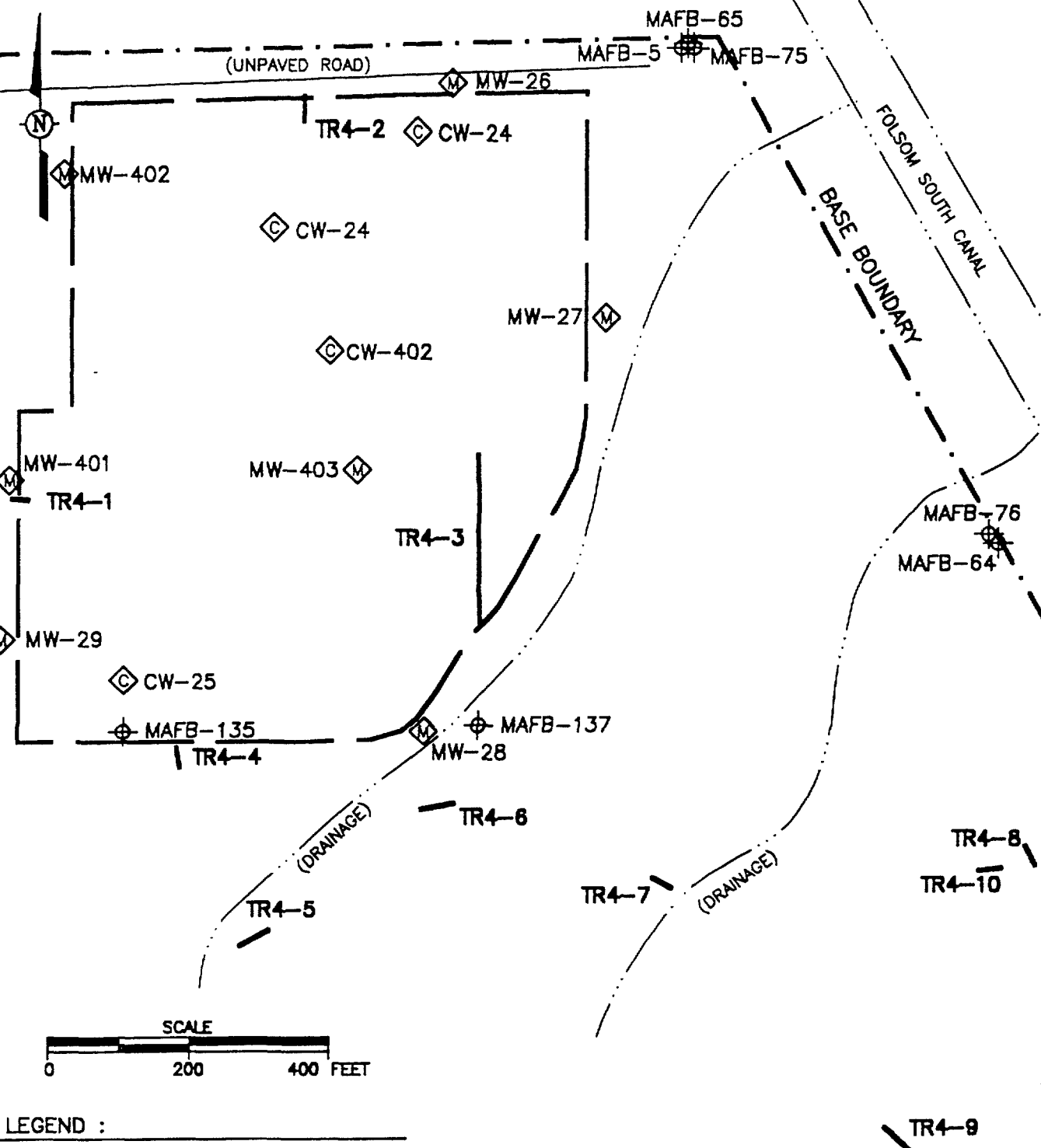
1.3.4 Site 4: Northeast Perimeter Landfill No. 2

Site 4 is adjacent to and east of Site 3, and was the main sanitary landfill site for the entire Base from 1967 through 1971 (see Figure 1.3). Operations were reportedly similar to those conducted at Site 3, and included daily filling, burning, and covering operations. The trenches are discernable across the surface due to settling and extensive surface cracking. A POL waste disposal pit was reportedly located at the northeast corner of the site and was in operation for approximately two years during the late 1960s. Trichloroethylene may have been present in the POL waste.

Investigations at Site 4 consisted of landfill gas characterization and monitoring, geophysical surveying, soil sampling and trenching, and groundwater monitoring. Table 2.4 presents a chronologic summary of the investigation results. Two CWs (CW-24 and 25) and four MWs (MW-26 through MW-29) were installed and sampled. Trichloroethylene, PCE, and THC were detected. Methane was detected in both Wells CW-24 and CW-25. Refuse was encountered during drilling of the CWs. Two additional CWs (CW-401 and 402) and three MWs (MW-401, 402 and 403) were installed and sampled for methane. Six other wells (MW-26 through MW-29 and CW-24 and 25) were also resampled for methane. None of the perimeter MWs detected methane. Methane was detected in both Wells CW-401 and CW-402.

Eight DSBs (DSB-A-4A through DSB-A-4H) were drilled and sampled. Chlorobenzene, diesel, gasoline, ethylbenzene, and oil and grease were detected. All metals were below TTLCs. Four surface soil samples (SS-4A through SS-4D) were collected and analyzed. Toluene, gasoline, diesel, 2-butanone, and oil and grease were detected. Six sediment samples (SD-4A through SD-4D) were collected and analyzed. Toluene, ethylbenzene, diesel, 2-butanone, and gasoline were detected. Ten soil samples were collected during drilling of Wells CW-401 and CW-402 and analyzed for geotechnical parameters. Also, three surface bulk samples were collected for geotechnical analyses. Ten trenches (TR4-1 through TR4-10) were excavated to assess the lateral extent of refuse in the landfill. Four of the trenches (TR4-1 through TR4-4) encountered refuse. Trench TR4-3 showed evidence of burned refuse.

DRAWING NUMBER 199817-A496
 CHECKED BY B.J.
 APPROVED BY 2-5-93
 DRAWN BY



- LEGEND :
- CW-401

 GAS CHARACTERIZATION WELL
 - MW-403

 GAS MIGRATION WELL
 - MAFB-76

 WATER MONITORING WELL
 - — — — —
 LANDFILL PERIMETER BASED ON
 GEOPHYSICS, DRILLING, AND TRENCHING
 - TR4-1

 TRENCH LOCATION

FIGURE 1.3
 NORTHEAST PERIMETER LANDFILL NO. 2
 SITE 4
 PREPARED FOR
 MATHER AIR FORCE BASE
 SACRAMENTO, CALIFORNIA

 INTERNATIONAL
 TECHNOLOGY
 CORPORATION

MA-L2S4R(MA183)

Three shallow groundwater monitoring wells, i.e., Wells MAFB-19 through MAFB-21, were installed and sampled. Dichloroethylene, TCE, and PCE were detected mainly in Well MAFB-21. Well MAFB-19 was not redeveloped or sampled due to well damage. No significant contamination was detected in Well MAFB-20. Groundwater samples were collected from perimeter Well MAFB-5 and analyzed for target analytes. Trichloroethylene, PCE, toluene, xylenes, benzene, and DCE were detected. Three surface water samples (SW-4A, SW-4B, and SW-4F) were collected and analyzed. Diesel and total lead were detected. All inorganics were below MCLs. Wells MAFB-19 and 20 were dry in 1990 and were replaced by MAFB-136 and 132, respectively.

Actual or threatened releases of hazardous substances from Site 4, if not addressed by implementing the response actions selected in this ROD, may present a current or potential threat to public health, welfare, or the environment.

1.3.5 Site 5: Northeast Perimeter Landfill No. 3

Site 5, which is located south of Site 4, was the main sanitary landfill during 1971 (see Figure 1.4). This site consists of two major east-west trending trenches and an apparently narrower trench which extends further to the east. The location of the major trenches is visible due to extensive cracking and settling of the surface soils. Following disposal in the landfill, the wastes were covered without being burned. Small quantities of drummed POL wastes may have been disposed at this site.

Investigations at Site 5 consisted of landfill gas characterization and monitoring, geophysical surveying, soil sampling and trenching, and groundwater monitoring. Table 2.5 presents a chronologic summary of the investigation results. One CW (CW-30) and two MWs (MW-31 and MW-32) were installed. Trichloroethylene, PCE, and benzene were detected. Methane was detected in Well CW-30. An additional CW (CW-501) and four MWs (MW-501 through MW-504) were installed and sampled for methane. The existing wells (MW-31, MW-32, and CW-30) were also resampled for methane. None of the perimeter MWs detected methane. The maximum detected methane concentration was in Well CW-30.

Three DSBs (DSB-A-5A through DSB-A-5C) were drilled and sampled. Gasoline and oil and grease were detected. Detected inorganics were below TTLCs. Two surface soil samples (SS-A-5A and SS-A-5B) were collected and analyzed. Toluene, diesel, and oil and grease were detected. Inorganic constituents were detected at levels below TTLCs.

RI/2-94/ES/126001.AWS

1-11

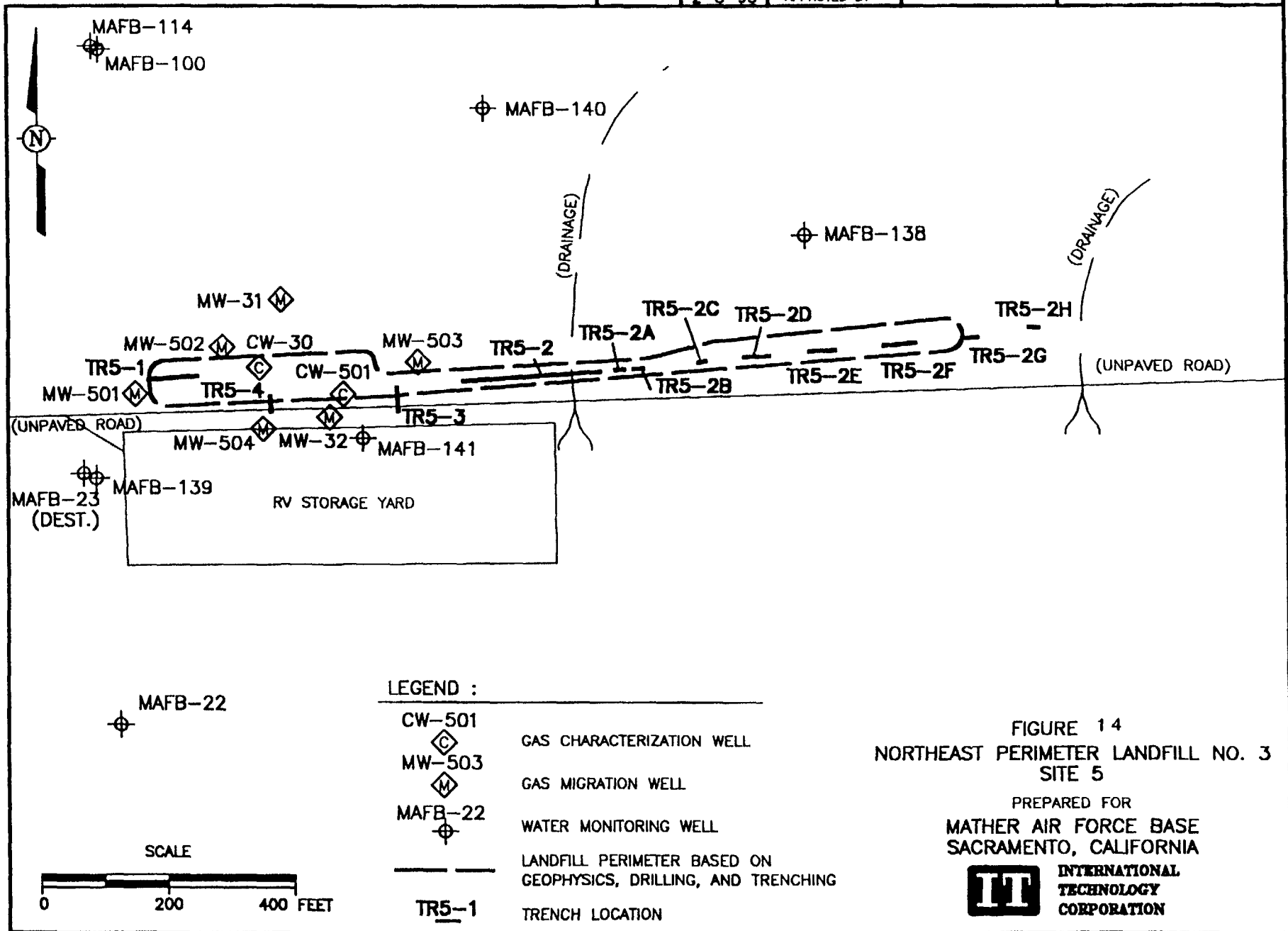


FIGURE 14
 NORTHEAST PERIMETER LANDFILL NO. 3
 SITE 5
 PREPARED FOR
 MATHER AIR FORCE BASE
 SACRAMENTO, CALIFORNIA
IT INTERNATIONAL
 TECHNOLOGY
 CORPORATION

One sediment sample (SD-5A) was collected and analyzed. Toluene and gasoline were detected. Inorganic constituents were detected at levels below TTLCs. Six soil samples were collected during drilling of Well CW-501 and analyzed for geotechnical parameters. Also, three surface bulk samples were collected for geotechnical analyses. Twelve trenches (TR5-1 through TR5-4 and TR5-2A through TR5-2H) were excavated to assess the lateral extent of refuse in the landfills. All trenches, except trenches TR5-2G and 2H, encountered refuse with little or no evidence of burning. Trenches showed the eastward extent of refuse extent was greater than expected.

Groundwater monitoring wells MAFB-22 and MAFB-23 were installed and sampled. No significant contaminants were detected in Well MAFB-22. Samples from Well MAFB-23 contained DCE, PCE, 1,2-DCP, and dichloroethane (DCA). Well MAFB-23 was not redeveloped or sampled due to well damage. Groundwater samples were collected from Wells MAFB-139 and MAFB-141 and analyzed for target analytes. Chloromethane, 1,1-DCA, TCE, and 1,2-DCP were detected. One surface water sample (SW-5A) was collected and analyzed. Diesel and total lead were detected. Inorganic constituents were detected at levels below MCLs. Four quarters (1991) of sampling for SWAT metals and VOCs were conducted in Wells MAFB-139, 140, and 141. The compounds 1,1-DCA, 1,2-DCP, chloroform, chloromethane, methylene chloride, PCE, TCE, and DCE were detected. All detected inorganic constituents were below established STLCS and MCLs.

Actual or threatened releases of hazardous substances from Site 5, if not addressed by implementing the response actions selected in this ROD, may present a current or potential threat to public health, welfare, or the environment.

1.3.6 Site 6: Firing Range Landfill Site

Site 6 is located in the southeastern portion of the now inactive Mather AFB and was the main sanitary landfill site for the Base from 1972 through 1974 (see Figure 1.5). Site 6 consists of two soil-covered landfills, one north and one south of an intermittent stream channel. Refuse (primarily garbage and household trash) was dumped into the landfill trenches. Small quantities of drummed used and unused paint thinners, and POL wastes were reportedly disposed at this site. Extensive settling and surface cracking of the surface soil is evident at both landfills.

RI/2-94/ES/1260001.AWS

1-13

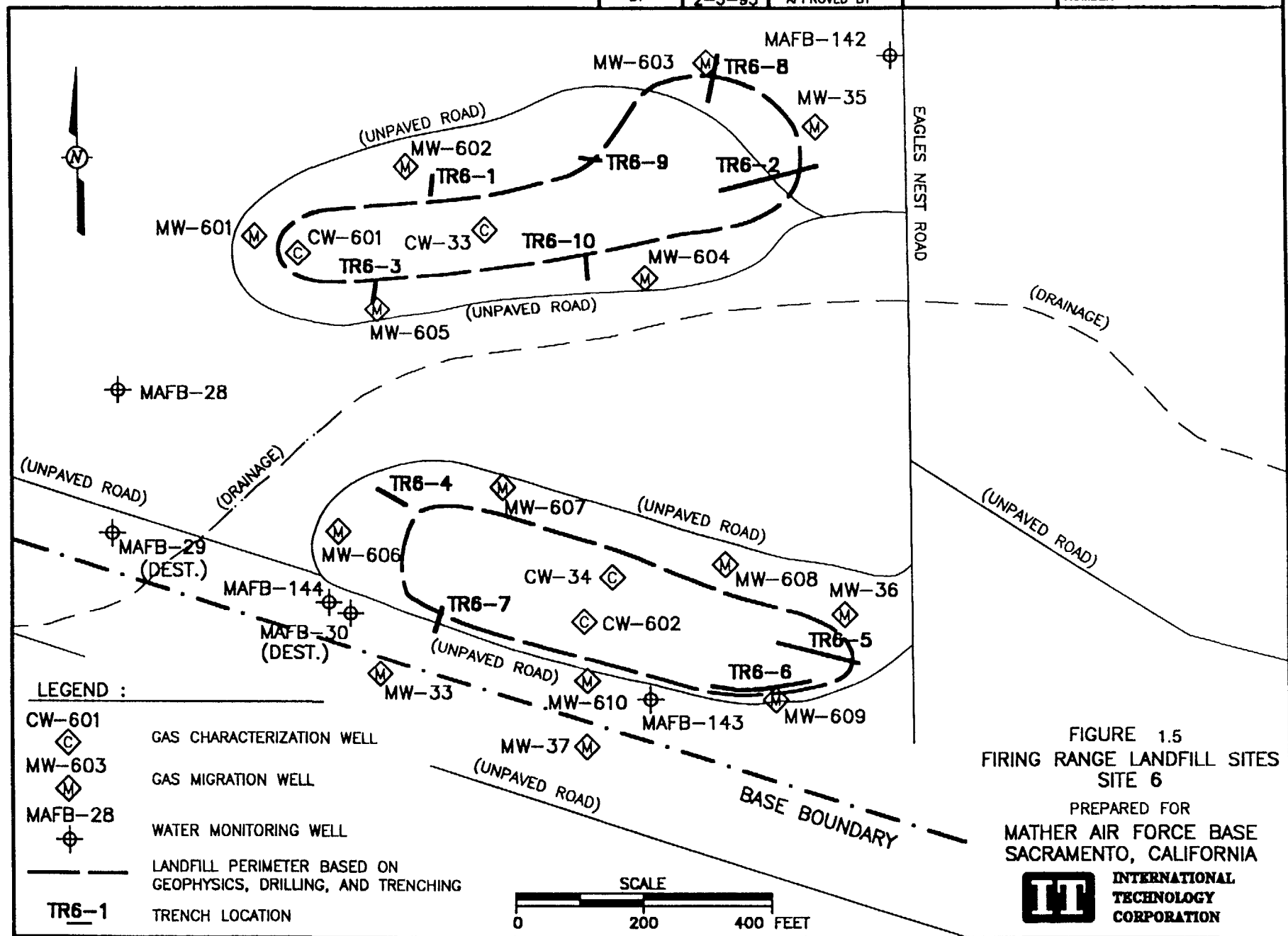


FIGURE 1.5
FIRING RANGE LANDFILL SITES
SITE 6

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MATHER AIR FORCE BASE
SACRAMENTO, CALIFORNIA



Investigations at Site 6 consisted of landfill gas characterization and monitoring, soil sampling and trenching, and groundwater monitoring. Table 2.6 presents a chronologic summary of the investigation results. Two CWs (CW-33 and CW-34) and four MWs (MW-35 through MW-38) were installed and sampled. Vinyl chloride, TCE, PCE, benzene, 1,1,1-TCA, and THC were detected. Methane was detected in Wells CW-33 and CW-34. Four wells CW-33, CW-34, MW-35, and MW-36 were resampled; vinyl chloride, benzene, and TCE were detected. Two additional CWs (CW-601 and 602) and ten MWs (MW-601 through MW-610) were installed and sampled for methane; Wells CW-33 and 34 were also resampled for methane. None of the perimeter MWs detected methane. The maximum methane concentration detected was in Well CW-33.

Eight DSBs (DSB-A-6A through DSB-A-6H) were drilled and sampled.

1,2-dichlorobenzene, gasoline, 1,4-DCB, 4,4-dichlorodiphenyldichloroethane (DDD), 4,4-dichlorodiphenyldichloroethylene (DDE), monochlorobenzene (MCB), ethylbenzene, xylenes, 4,4-dichlorodiphenyltrichloroethane (DDT), oil and grease, heptachlor epoxide, gamma-Chlordane, and diesel were detected. All detected inorganics were below TTLCs. Four surface soil samples (SS-6A through SS-6D) were collected and analyzed. Diesel and oil and grease were detected. All detected inorganics were below TTLCs. Sediment samples SD-6A, SD-6B, and SD-6C were collected and analyzed. Only inorganic constituents were detected, all of which were below TTLCs. Eight soil samples were collected during drilling of wells CW-601 and CW-602 and analyzed for geotechnical parameters. Also, three bulk soil samples were collected for geotechnical analyses. Ten trenches were excavated (TR6-1 through TR6-10) to assess the lateral extent of the refuse in the landfills. Seven of the ten trenches encountered refuse with little or no evidence of burning.

Three shallow groundwater monitoring wells were installed and sampled (MAFB-28, 29, and 30). No significant contamination was detected. Groundwater monitoring wells MAFB-142, 143 and 144 were installed. Groundwater samples were collected from Wells MAFB-28, 142, 143, and 144 and analyzed. There were no detections in Well MAFB-28. Total petroleum hydrocarbons (TPH) as diesel, oil and grease, total lead, and benzyl chloride were detected in Wells MAFB-142, 143, and 144. Three surface water samples (SW-6A through SW-6C) were collected and analyzed. Diesel and total lead were detected. All detected inorganics were below drinking water MCLs.

Actual or threatened releases of hazardous substances from Site 6, if not addressed by implementing the response actions selected in this ROD, may present a current or potential threat to public health, welfare, or the environment.

1.4 Description of the Selected Remedy

This OU addresses only remedies related to contamination of the soils at Sites 1 through 6. Any contamination of the groundwater underlying these sites will be addressed as part of a separate Groundwater OU ROD.

Based on the human health risk assessment, all risks are within the acceptable range of 1×10^{-4} to 1×10^{-6} in their current state. Therefore, the selected remedies will be instituted to prevent contact with the landfill contents and comply with landfill closure regulations.

The following sections provide the major components of the selected remedy for each of the Landfill OU sites.

1.4.1 Site 1 - Runway Overrun Landfill

No refuse or contaminants were found during investigative activities. Therefore, it is believed that all refuse was removed prior to construction of the runway overrun. Since there is no refuse or soil contamination, no potential source for contamination exists. Therefore, no further action is the selected remedy.

1.4.2 Site 2 - "8150" Area Landfill

The selected remedy for Site 2 is a vegetative cover. The major components of this remedy include:

- installing a vegetative cover;
- installing passive gas vent wells;
- monitoring of groundwater and landfill gas; and
- invoking access restrictions.

1.4.3 Site 3 - Northeast Perimeter Landfill No. 1

The selected remedy for Site 3 is an engineered cap. The major components of this remedy include:

- installing an engineered cap;

- installing passive gas vent wells;
- monitoring of groundwater and landfill gas; and
- invoking access restrictions.

1.4.4 Site 4 - Northeast Perimeter Landfill No. 2

The selected remedy for Site 4 is an engineered cap and embankment. The major components of this remedy include:

- installing an engineered cap;
- installing flood control measures (e.g., embankment);
- installing passive gas vent wells;
- monitoring of groundwater and landfill gas; and
- invoking access restrictions.

1.4.5 Site 5 - Northeast Perimeter Landfill No. 3

The selected remedy for Site 5 is excavation and consolidation. The major components of this remedy include:

- excavating the landfill materials;
- transporting the material to, and consolidating it with the landfill materials at Site 4; and
- monitoring the groundwater.

1.4.6 Site 6 - Firing Range Landfill Sites

The selected remedy for Site 6 is excavation and consolidation. The major components of this remedy include:

- excavating the landfill materials;
- transporting the material to, and consolidating it with the landfill materials at Site 4; and
- monitoring the groundwater.

1.5 Statutory Determinations

The selected remedies satisfy the statutory requirements of Section 121(b) of CERCLA, as amended by SARA, in that the following four mandates are attained:

- The selected remedies are protective of human health and the environment.

- The selected remedies comply with federal and state requirements that are legally applicable or relevant and appropriate to the remedial actions.
- The selected remedies are cost-effective.
- The selected remedies utilize permanent solutions and alternative treatment technologies, or resource recovery technologies, to the maximum extent practicable.

However, because treatment of the principal threats at the sites was not found to be practicable, these remedies do not satisfy the statutory preference for treatment as a principal element of the remedies. The facts that no onsite "hot spots" exist that represent continuing major sources of contamination, and no unacceptable risk exists from the landfills in their current state, preclude remedies in which contaminants would be excavated and treated in a cost-effective manner. The remedy for Landfill OU Sites 2, 3, and 4 will result in hazardous substances remaining onsite above health-based levels during the remedial action. Therefore, a review will be conducted within five years after commencement of the remedial action to ensure that the remedy continues to provide adequate protection of human health and the environment.

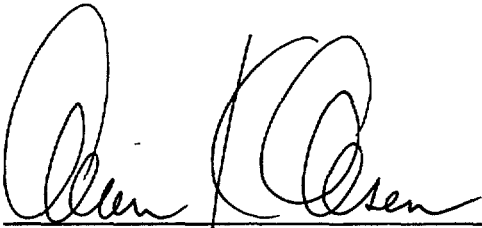
1.6 Signatures



Julie Anderson

Director, Federal Facilities Cleanup Office, Region IX
U.S. Environmental Protection Agency

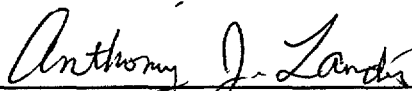
8/3/95
Date



Alan K. Olsen

Director Air Force Base Conversion Agency
U.S. Air Force

July 28, 1995
Date



Anthony J. Landis, P.E.

Chief, Northern California Operations
Office of Military Facilities
Department of Toxic Substances Control
California Environmental Protection Agency

8-7-95
Date

2.0 Decision Summary

2.1 Site Name, Location, and Description

The now inactive Mather AFB is located in the Central Valley region of northern California in Sacramento County, approximately 12 miles east of downtown Sacramento, California and due south of unincorporated Rancho Cordova, California, as shown on Figure 2.1. The now inactive Base is due south of U.S. Highway 50, a major highway connecting Sacramento and South Lake Tahoe. Mather AFB was constructed in 1918 and its primary mission was as a flight training school. The now inactive Base encompassed at the time of closure approximately 5,845 acres (129 acres of easements) in an unsurveyed part of Township 8 North, Ranges 6 East and 7 East. The Base was decommissioned under the Base Closure and Realignment Act (BCRA) on September 30, 1993.

The sites which comprise the Landfill OU at the now inactive Mather AFB include: Site 1 - Runway Overrun Landfill; Site 2 - "8150" Area Landfill; Site 3 - Northeast Perimeter Landfill No. 1; Site 4 - Northeast Perimeter Landfill No. 2; Site 5 - Northeast Perimeter Landfill No. 3; and Site 6 - Firing Range Landfill Sites. Figure 2.2 presents a location map of the Landfill OU sites.

Topography at the sites is nearly flat and vegetation consists of annual grasses. At Sites 3, 4, 5, and 6, the landfill trenches are visible across the surface due to settling and extensive surface cracking. Surface features at the sites include wetlands near Sites 3, 4, and 6, portions of Sites 4, 5, and 6 that are within the 100-year floodplain of Morrison Creek and its tributaries, and an intermittent tributary of Morrison Creek between the two landfills at Site 6.

There is no present onbase residential area near any of the Landfill OU sites. Before the Base was decommissioned, the nearest onbase residential area was near Sites 1 and 2. The nearest offbase residential area was, and remains, near Site 6.

2.2 Site History and Enforcement Activities

Mather AFB was constructed in 1918 and its primary mission was as a flight training school. The Base was decommissioned on September 30, 1993.

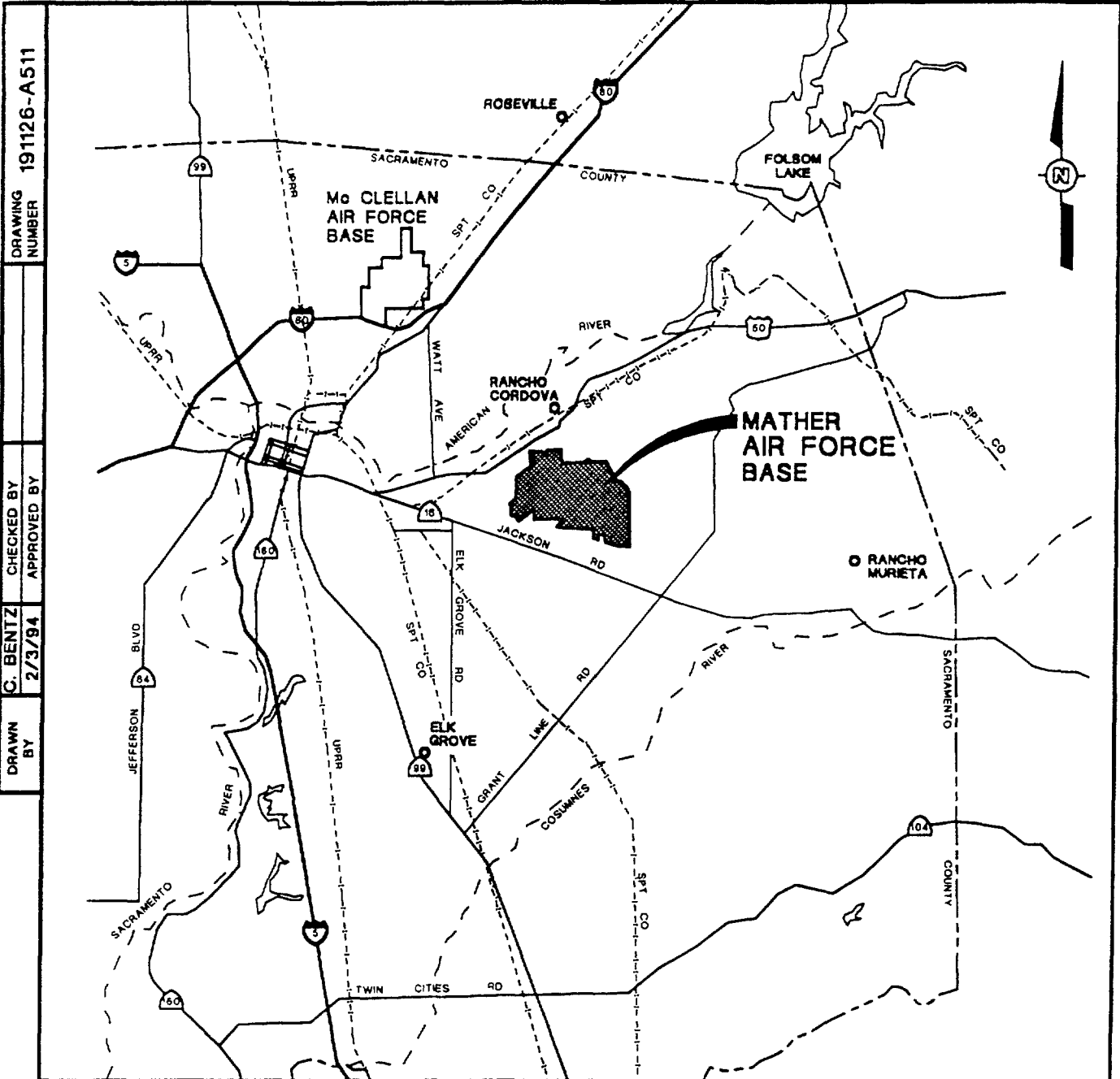


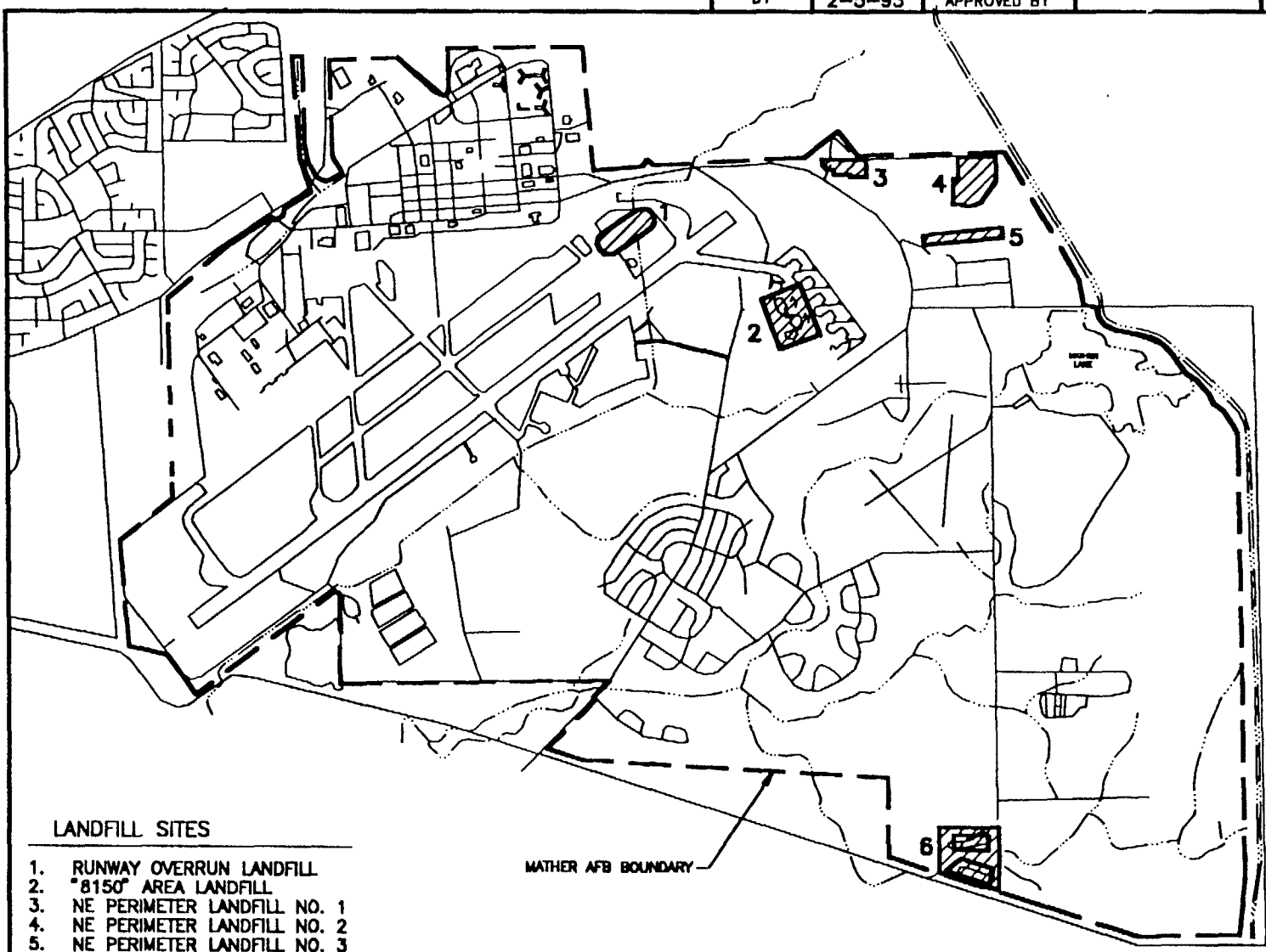
FIGURE 2.1

SITE VICINITY MAP

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SACRAMENTO, CALIFORNIA



DRAWN BY	B.J.	CHECKED BY		DRAWING NUMBER	199817-A493
	2-5-93	APPROVED BY			



LANDFILL SITES

1. RUNWAY OVERRUN LANDFILL
2. "8150" AREA LANDFILL
3. NE PERIMETER LANDFILL NO. 1
4. NE PERIMETER LANDFILL NO. 2
5. NE PERIMETER LANDFILL NO. 3
6. FIRING RANGE LANDFILL SITES

MATHER AFB BOUNDARY

 IRP SITE

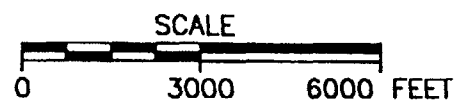


FIGURE 2.2
LOCATIONS OF
LANDFILL SITES

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Contamination exists at the landfill sites as a result of past Air Force operations conducted between 1918 and 1974. The landfills were mainly used for the disposal of general and sanitary refuse. In addition to garbage and household trash, it was reported that POL wastes, as well as waste solvents, primarily TCE, may have been disposed in the landfills. It has also been reported that daily burning of the refuse occurred at two of the landfill sites (Sites 3 and 4).

Remedial investigation (RI) activities at the now inactive Base have been conducted since 1982. These previous investigations have confirmed the presence of VOCs and other hydrocarbons at several of the U.S. Air Force IRP sites. Based on this, the entire Base was proposed for listing on the Superfund (CERCLA) National Priorities List (NPL) in July 1989. Mather AFB was placed on the CERCLA NPL list on November 21, 1989. In July 1989, the U.S. Air Force, the U.S. EPA, and the State of California signed a Federal Facility Agreement (FFA) under CERCLA Section 120 to ensure that environmental impacts from past and present operations are thoroughly investigated and appropriate cleanup actions are taken to protect health, welfare, and the environment. The U.S. Air Force is the owner of the site, the principal responsible party (PRP), and lead agency for conducting investigative and cleanup activities. There have been no CERCLA enforcement actions at the Landfill OU sites.

Previous RIs have been conducted at the Landfill OU sites as part of the Air Force IRP. The dates, type of studies, and organization conducting the studies, are summarized in Tables 2.1 through 2.6 and include:

- IRP Records Search for Mather AFB, Phase I, June 1982 [CH2M-Hill, Inc. 1982];
- IRP Phase II, Stage 2 Investigation, June 1987 [AeroVironment 1987];
- Well Redevelopment and Sampling Plan, July 1988 [IT 1988a];
- Quarterly Routine Groundwater Sampling, October 1988 to present [IT 1993a-b] and [EA 1990a-c];
- Landfill Gas Testing Report, July 1988 [IT 1988b];
- Site Inspection Report, August 1990 [IT 1990b];
- Group 2 Sites Remedial Investigation Report, April 1993 [IT 1993c];

- Solid Waste Assessment Test Report, March 1993 [IT 1993d]; and
- Landfill OU Focused Feasibility Study (FFS) Report, October 1993 [IT 1993e].

In 1982 the Air Force Engineering and Services Center retained CH2M-Hill, Inc., to conduct a Phase I onbase records search [CH2M-Hill 1982]. The primary objective was to evaluate waste disposal sites and disposal practices at Mather AFB. Major findings included:

- identifying and prioritizing for additional investigations a total of 23 disposal or spill sites; and
- determining that TCE was a commonly used solvent on the Base from 1958 through 1974.

The Phase I records search was followed by the Phase II, Stage 1 Investigation by Roy F. Weston, Inc. However, this investigation did not address the landfill sites. A Phase II, Stage 2 Investigation was conducted in 1985 and early 1986 by AeroVironment, Inc., [AeroVironment 1987]. Activities included:

- installing and sampling of 16 shallow monitoring wells, Wells MAFB-14 through MAFB-26 and Wells MAFB-28 through MAFB-30, at Sites 1 through 6; and
- conducting ground penetrating radar and terrain conductivity surveys at Sites 1, 3, 4, and 5.

AeroVironment, Inc., conducted a Phase II, Stage 3 Investigation [Aerovironment 1988] at essentially the same sites included in the Phase II, Stage 1 Investigation. However, the landfill sites were not addressed.

In the Fall of 1988, IT Corporation conducted a redevelopment and groundwater sampling program for all useable groundwater monitoring wells at Mather AFB, including those at the Landfill OU sites [IT 1988a]. Redevelopment began in August 1988 and was completed in October 1988. Well sampling began in October 1988 and was completed in November 1988.

The quarterly sampling and analysis program of Mather AFB groundwater monitoring wells began in the 4th quarter of 1989 and continues through the present.

IT Corporation performed quarterly sampling and analysis for the 3rd quarter of 1989 and the 1st quarter of 1990. EA Engineering, Science and Technology, Inc. [EA 1990a-c] performed quarterly sampling and analysis for the 2nd, 3rd, and 4th quarters of 1990. IT Corporation has been performing quarterly sampling and analysis since the 1st quarter of 1991. Analytical results for selected analytes are presented in Tables 2.7 through 2.12.

In 1988, IT Corporation installed and sampled 17 shallow CWs and 29 shallow MWs in order to identify the composition of the vapor or gas immediately above or adjacent to confirmed or suspected solid waste disposal sites. Thirteen of the CWs and 23 of the MWs were located at Sites 1 through 6. The remaining gas wells were installed at Sites 7 and 18. Results are presented in Tables 2.1 through 2.6.

In 1987 and 1988 a variety of tasks were performed as part of the Site Inspection Report [IT 1990a] to develop a comprehensive base-wide evaluation of existing geologic and chemical data related to potential environmental contamination at Mather AFB. Tasks conducted in order to complete the Site Inspection Report included:

- collecting two rounds of water level measurements from all onbase monitoring wells to establish hydraulic conditions;
- reviewing for accuracy available well location, well construction, and groundwater analytical data;
- evaluating and listing Applicable or Relevant and Appropriate Requirements (ARAR) of the federal, State of California, and local regulations to be utilized and considered in the IRP investigations at Mather AFB; and
- developing recommendations for future work to more clearly define contaminant migration pathways.

Investigations were conducted at the inactive landfill sites during the Group 2 Sites RI (field work implemented from August 1990 through November 1991). The primary objectives of the RI were to:

- determine whether environmental contaminants existed at each site, and if so, aid in determining their lateral and vertical extent in the soil;
- identify the transport pathways and fate of any chemical constituents present; and
- provide data for, and conduct a baseline health risk assessment of, current and projected risks to public health and the environment posed by chemical constituents.

Activities were conducted as part of the SWAT work scope in conjunction with the Group 2 Sites RI. The purpose of the SWAT activities was to implement guidelines from the Technical Guidance Manual, SWAT [SWRCB 1988a], which would characterize the landfill sites. Activities included:

- drilling soil borings, and collecting and analyzing soil samples for SWAT parameters;
- drilling and installing groundwater monitoring wells;
- collecting quarterly groundwater samples and analyzing for SWAT parameters; and
- drilling and logging stratigraphic borings.

In 1992, as part of the FFS, field activities were conducted at each of the landfill sites. Activities were performed to provide additional information on the character or extent of refuse within each Landfill OU site; determine the extent of gas migration in and around the landfill sites; define the area of impact for closure; and determine the adequacy of surface materials for use as landfill cover. Primary field activities and their objectives included:

- Conducting area-wide surface geophysics to aid in the delineation of the areal extent of buried refuse;
- Drilling and sampling of the soils during well installation to assess lithology and waste characteristics in and around the landfills. Collecting surface bulk samples to provide information regarding the adequacy of surficial soils for use as landfill cover materials;
- Installing and sampling CWs and MWs to determine the magnitude and extent of methane generation and migration;

- Excavating trenches to confirm or establish landfill limits and boundaries;
and
- Surveying and locating all soil borings, trenches, and wells.

Table 2.1 Site 1 - Results of Previous Investigations

Investigation and Investigator	Air Investigation and Significant Analytical Results	Soil Investigation and Significant Analytical Results	Groundwater Investigation and Significant Analytical Results	Other Activities	References
IRP Phase I, Records Search - CH2M-Hill	None	None	None	Base Records Search	[CH2M-Hill 1982]
IRP Phase II, Stage 2 Investigation - AeroVironment, Inc.	None	Conducted GPR and terrain conductivity surveys.	Installed and sampled two shallow wells: MAFB-14 and MAFB-15. Maximum contaminants detected were: DCE (11 ppb); TCE (2.4 ppb); PCE (9.7 ppb); and 1,2-dichloropropane (0.32 ppb).	None	[AeroVironment 1987]
Well Redevelopment and Sampling - IT Corporation	None	None	Wells MAFB-14 and MAFB-15 were not redeveloped or sampled due to well damage.	None	[IT 1990b]
Quarterly Routine Groundwater Sampling - IT Corporation and EA Engineering, Science and Technology, Inc.	None	None	Data for selected constituents were summarized in the Quarterly Groundwater Monitoring Reports. See Table 2.7 for a summary of quarterly data for selected analytes.	None	[EA 1990a] [EA 1990b] [EA 1990c] [IT 1993a] [IT 1993b]
Landfill Gas Testing - IT Corporation	None	Installed and sampled two CWs (CW-2 and CW-3) and five MWs (MW-4 through MW-8). Detected THC (1.2 to 13 ppm). Methane was not detected in either CW. No refuse or debris was encountered in the CWs drilled in the suspected landfill trench location or perimeter MWs.	None	None	[IT 1988b]
IRP, Site Inspection - IT Corporation	None	Evaluated all geologic and chemical data relating to environmental contamination at Mather AFB. No sampling or analysis conducted.	Evaluated all geologic and chemical data relating to environmental contamination at Mather AFB. Data from 1988 groundwater sampling was included. Conducted two rounds of water level measurements for all onbase monitoring wells.	None	[IT 1990a]

Table 2.1 Site 1 - Results of Previous Investigations (continued)

Investigation and Investigator	Air Investigation and Significant Analytical Results	Soil Investigation and Significant Analytical Results	Groundwater Investigation and Significant Analytical Results	Other Activities	References
Group 2 Sites Remedial Investigation - IT Corporation	None	None	None	None	[IT 1993c]
Solid Waste Assessment Report - IT Corporation	None	Five DSBs (DSB-T-1A through DSB-T-1E) were drilled and sampled. Maximum contaminant concentrations detected: diesel (<10 ppm); oil and grease (75 ppm); and methylene chloride (0.02 ppm). Inorganics were detected below TTLCs.	Wells MAFB-14 and 15 were abandoned and replaced with MAFB-125. Installed wells MAFB-115 and 126. Four quarters (1991) of sampling for SWAT metals and VOCs was conducted in wells MAFB-115, 125, and 126. Maximum concentrations detected were: PCE (4.9 ppb); TCE (2.3 ppb); DCE (4.4 ppb).	None	[IT 1993d]
Landfill OU Focused Feasibility Study - IT Corporation	None	None	None	None	[IT 1993e]

Note: An Air Force NFAD was filed and stated that the refuse appeared to have been removed.

None - media not investigated
 TTLC - total threshold limit concentration
 NFAD - no further action decision
 MW - migration well
 TCE - trichloroethylene
 PCE - tetrachloroethylene
 DCE - dichloroethylene
 THC - total hydrocarbon content
 OU - operable unit

AFB - Air Force Base
 GPR - ground penetrating radar
 CW - characterization well
 ppm - parts per million
 SWAT - Solid Waste Assessment Test
 DSB - deep soil boring
 VOC - volatile organic compound
 IRP - Installation Restoration Program
 ppb - parts per billion

Table 2.2 Site 2 - Results of Previous Investigations

Investigation and Investigator	Air Investigation and Significant Analytical Results	Soil Investigation and Significant Analytical Results	Groundwater Investigation and Significant Analytical Results	Other Activities	References
IRP Phase I, Records Search - CH2M-Hill	None	None	None	Base Records Search	[CH2M-Hill 1982]
IRP Phase II, Stage 2 Investigation - AeroVironment, Inc.	None	None	Three shallow wells were installed and sampled (MAFB-16, MAFB-17, MAFB-18). No significant levels of VOCs detected. Maximum contaminant concentrations detected were: total oil and grease (3.4 ppm) and lead (72 ppb).	None	[AeroVironment 1987]
Well Redevelopment and Sampling - IT Corporation	None	None	Well MAFB-16 was not redeveloped or sampled due to well damage. No significant levels of contamination detected in Wells MAFB-17 or -18.	None	[IT 1990b]
Quarterly Routine Groundwater Sampling - IT Corporation and EA Engineering, Science and Technology, Inc.	None	None	Data for selected constituents were summarized in the Quarterly Groundwater Monitoring Reports. See Table 2.8 for a summary of quarterly data for selected analytes.	None	[EA 1990a] [EA 1990b] [EA 1990c] [IT 1993a] [IT 1993b]
Landfill Gas Testing - IT Corporation	None	Three landfill gas characterization wells (CW-9 through CW-11) and four landfill gas migration wells (MW-12 through MW-15) were installed and sampled. In CW-9 and CW-11 carbon dioxide and methane were not detected. Maximum detected concentrations of other compounds were: trichloromethane (6.4 ppb); tetrachloromethane (20 ppb); 1,1,1-TCA (100 ppb); TCE (27 ppb); and PCE (67 ppb). A vapor sample could not be collected from CW-10 because the well contained water. Migration well samples were analyzed only for THC; MW-13, MW-14, and MW-15 contained ≤ 12 ppm THC; MW-12 contained 100,000 ppm THC. No refuse or debris encountered.	Sampled groundwater from landfill vapor Well CW-10. The only compound detected was total lead (18.8 ppb)	None	[IT 1988b]

Table 2.2 Site 2 - Results of Previous Investigations (continued)

Investigation and Investigator	Air Investigation and Significant Analytical Results	Soil Investigation and Significant Analytical Results	Groundwater Investigation and Significant Analytical Results	Other Activities	References
IRP, Site Inspection - IT Corporation	None	Evaluated all geologic and chemical data relating to environmental contamination at Mather AFB. No sampling or analysis conducted.	Evaluated all geologic and chemical data relating to environmental contamination at Mather AFB. Data from 1988 groundwater sampling was included. Conducted two rounds of water level measurements for all onbase monitoring wells.	None	[IT 1990a]
Group 2 Sites Remedial Investigation - IT Corporation	Integrated surface air samples collected from two grid locations. Maximum contaminant detected was: benzene (0.33 ppb) at only one of the grids.	Original landfill gas migration wells (MW-12 through MW-15) were resampled for methane. Maximum methane detected was 1.7% in MW-12. Five deep soil borings (DSB-A-2A through DSB-A-2E) were drilled and sampled (50 samples). Maximum detected contaminant levels: 1,4-DCB (0.18 ppm); diesel (<10 ppm); and total oil and grease (94 ppm). All detected inorganics were below TTLCs.	Initial/1st, 2nd, and 3rd quarter 1991 sampling of Wells MAFB-127, 128, and 129 detected total lead (3.2 to 9.4, ND, and ND). All other constituents were below detection limits.	None	[IT 1993c]
Solid Waste Assessment Report - IT Corporation	None	None	Wells MAFB-16 and 17 were abandoned and replaced with MAFB-127 and 128. Installed well MAFB-129 for SWAT monitoring network. Four quarters (1991) of sampling for SWAT metals and VOCs was conducted in Wells MAFB-18, 127, 128, and 129. All values detected below established STLCs and MCLs. No pesticides or PCBs detected.	None	[IT 1993d]

Table 2.2 Site 2 - Results of Previous Investigations (continued)

Investigation and Investigator	Air Investigation and Significant Analytical Results	Soil Investigation and Significant Analytical Results	Groundwater Investigation and Significant Analytical Results	Other Activities	References
Landfill OU Focused Feasibility Study - IT Corporation	None	<p>Five trenches (IWMB-1 through IWMB-5) were excavated by Base Civil Engineering in coordination with the IWMB. Confirmed the presence of refuse (mainly glass, bottles, and metal debris) in three of five trenches (IWMB-1, 4, and 5).</p> <p>Original landfill gas well (MW-12) was sampled and analyzed for methane. Methane was detected at 16%.</p> <p>Eight trenches (TR2-1 through TR2-8) were excavated to assess the lateral extent of refuse in the landfills. Two of the trenches (TR2-4 and TR2-8) encountered refuse. Trench TR2-4 showed evidence of burned refuse.</p>	None	An area-wide geophysical survey was conducted to identify the extent of refuse. Identified anomalies were investigated with trenches TR2-1 through TR2-8.	[IT 1993e]

None - media not investigated

STLC - soluble threshold limit concentration

MW - landfill gas migration well

TCE - trichloroethylene

PCE - tetrachloroethylene

TCA - trichloroethane

THC - total hydrocarbon content

MCL - maximum contaminant level

TTLC - total threshold limit concentration

IWMB - Integrated Waste Management Board

AFB - Air Force Base

CW - landfill gas characterization well

ppm - parts per million

SWAT - Solid Waste Assessment Test

DCB - dichlorobenzene

VOC - volatile organic compound

IRP - Installation Restoration Program

PCB - polychlorinated biphenyl

OU - operable unit

ppb - parts per billion

Table 2.3 Site 3 - Results of Previous Investigations

Investigation and Investigator	Air Investigation and Significant Analytical Results	Soil Investigation and Significant Analytical Results	Groundwater Investigation and Significant Analytical Results	Other Activities	References
IRP Phase I, Records Search - CH2M-Hill	None	None	None	Base Records Search	[CH2M-Hill 1982]
IRP Phase II, Stage 2 Investigation - AeroVironment, Inc.	None	Conducted GPR and terrain conductivity surveys.	Installed and sampled Wells MAFB-24, 25, and 26. Maximum detected contaminant concentrations: DCE (12 ppb); TCE (1.9 ppb); and 1,2-dichloropropane (2.1 ppb).	None	[AeroVironment 1987]
Well Redevelopment and Sampling - IT Corporation	None	None	No significant levels of contamination were detected at Wells MAFB-24 or -25. Maximum detected contaminant concentrations: PCE (13 ppb) and DCE (15 ppb) in well MAFB-26.	None	[IT 1990b]
Quarterly Routine Groundwater Sampling - IT Corporation and EA Engineering, Science and Technology, Inc.	None	None	Data for selected constituents were summarized in the Quarterly Groundwater Monitoring Reports. See Table 2.9 for a summary of quarterly data for selected analytes.	None	[EA 1990a] [EA 1990b] [EA 1990c] [IT 1993a] [IT 1993b]

Table 2.3 Site 3 - Results of Previous Investigations (continued)

Investigation and Investigator	Air Investigation and Significant Analytical Results	Soil Investigation and Significant Analytical Results	Groundwater Investigation and Significant Analytical Results	Other Activities	References
Landfill Gas Testing - IT Corporation	None	Installed and sampled three CWs (CW-16, 17, and 18) and four MWs (MW-19, 20, 22, and 23). Maximum concentrations detected were: THC (2 ppm); vinyl chloride (220 ppb); TCE (5.5 ppb); and PCE (3.3 ppb). Methane was not detected in any of the perimeter MWs. Methane was detected at 4.2% in well CW-18. Refuse was only encountered in Well CW-18.	None	None	[IT 1988b]
IRP, Site Inspection - IT Corporation	None	Evaluated all geologic and chemical data relating to environmental contamination at Mather AFB. No sampling or analysis conducted.	Evaluated all geologic and chemical data relating to environmental contamination at Mather AFB. Data from 1988 groundwater sampling was included. Conducted two rounds of water level measurements for all onbase monitoring wells.	None	[IT 1990a]

Table 2.3 Site 3 - Results of Previous Investigations (continued)

Investigation and Investigator	Air Investigation and Significant Analytical Results	Soil Investigation and Significant Analytical Results	Groundwater Investigation and Significant Analytical Results	Other Activities	References
Group 2 Sites Remedial Investigation - IT Corporation	Integrated surface air samples collected from five grid locations. Maximum detected contaminant concentrations were: benzene (0.81 ppb); methylene chloride (29 ppb); PCE (2.4 ppb); and 1,1,1-TCA (10 ppb).	<p>Ten DSBs (DSB-A-3A through 3J) were drilled and sampled (103 samples). Maximum detected contaminant concentrations were: trichlorofluoromethane (0.02 ppm); diesel (< 10 ppm); methylene chloride (0.02 ppm); and oil and grease (830 ppm). Detected inorganic constituents were below TTLCs.</p> <p>Four surface soil samples (SS-3A to SS-3D) were collected and sampled. Maximum contaminant concentrations detected were: toluene (12 ppb); xylene (5 ppb); oil and grease (3400 ppm); diesel (< 10 ppm); acenaphthene (40 ppb); anthracene (90 ppb); benzo(a)pyrene (570 ppb); pyrene (1130 ppb); phenanthrene (680 ppb); benzo(a)anthracene (550 ppb); benzo(b)fluoranthene (560 ppb); benzo(g,h,i)perylene ((J)250 ppb); benzo(k)fluoranthene (470 ppb); chrysene (620 ppb); fluoranthene (1110 ppb); ideno(1,2,3-cd)pyrene ((J)250 ppb); and acenaphthylene (40 ppb). All detected inorganics were below TTLCs.</p>	Installed and sampled Wells MAFB-111, 112, 130, 131, 132, and 133. Maximum detected concentrations were: TCE (3 ppb); PCE (6.2 ppb); and DCE (18 ppb).	None	[IT 1993c]

Table 2.3 Site 3 - Results of Previous Investigations (continued)

Investigation and Investigator	Air Investigation and Significant Analytical Results	Soil Investigation and Significant Analytical Results	Groundwater Investigation and Significant Analytical Results	Other Activities	References
Landfill OU Focused Feasibility Study - IT Corporation	None	<p>Two CWs (CW-301 and 302) and eight MWs (MW-301 through MW-308) were installed and sampled for methane. Two existing wells (CW-18 and MW-19) were also sampled for methane. None of the perimeter MWs detected methane. Methane was detected at a maximum of 9.7% (CW-302).</p> <p>Nine soil samples were collected during drilling of the CWs and analyzed for geotechnical parameters. Additionally, three surface bulk samples were collected for geotechnical analyses.</p> <p>Four trenches (TR3-1 through TR3-4) were excavated to assess the lateral extent of refuse in the landfills. All four trenches encountered refuse with little or no evidence of burning.</p>	A perched water sample from Well CW-301 was collected and analyzed. Vinyl chloride (140 ppb); DCE (25 ppb); and DCB (11 ppb) were detected in the sample.	None	[IT 1993e]

None - media not investigated
 STLC - soluble threshold limit concentration
 ppb - parts per billion
 TCE - trichloroethylene
 DCE - dichloroethylene
 TCA - trichloroethane
 PCE - tetrachloroethylene
 THC - total hydrocarbon content
 MCL - maximum contaminant level
 DCB - dichlorobenzene
 OU - operable unit
 ppm - parts per million

AFB - Air Force Base
 CW - landfill gas characterization well
 MW - landfill gas migration well
 SWAT - Solid Waste Assessment Test
 DSB - deep soil boring
 VOC - volatile organic compound
 TTLC - total threshold limit concentration
 IRP - Installation Restoration Program
 PCB - polychlorinated biphenyl
 GPR - ground penetrating radar
 J- estimated value

Table 2.4 Site 4 - Results of Previous Investigations

Investigation and Investigator	Air Investigation and Significant Analytical Results	Soil Investigation and Significant Analytical Results	Groundwater Investigation and Significant Analytical Results	Other Activities	References
IRP Phase I, Records Search - CH2M-Hill	None	None	None	Base Records Search	[CH2M-Hill 1982]
IRP Phase II, Stage 2 Investigation - AeroVironment, Inc.	None	Conducted GPR and terrain conductivity surveys.	Installed and sampled three shallow wells: MAFB-19 through MAFB-21. Maximum detected contaminant concentrations were: DCE (35 ppb); TCE (4.5 ppb); and PCE (35 ppb).	None	[AeroVironment 1987]
Well Redevelopment and Sampling - IT Corporation	None	None	Well MAFB-19 was not redeveloped or sampled due to well damage. No significant contamination was detected at well MAFB-20. Detected TCE (6 ppb); PCE (28 ppb); and DCE (35 ppb) in Well MAFB-21.	None	[IT 1990b]
Quarterly Routine Groundwater Sampling - IT Corporation and EA Engineering, Science and Technology, Inc.	None	None	Data for selected constituents were summarized in the Quarterly Groundwater Monitoring Reports. See Table 2.10 for a summary of quarterly data for selected analytes.	None	[EA 1990a] [EA 1990b] [EA 1990c] [IT 1993a] [IT 1993b]
Landfill Gas Testing - IT Corporation	None	Installed and sampled two CWs (CW-24 and 25) and four MWs (MW-26 through MW-29). Maximum detected contaminant concentrations were: TCE (4.8 ppb); PCE (4.6 ppb); and THC (23 ppm). Methane was detected at a maximum of 8.7% in Well CW-25. Refuse was encountered during drilling of the CWs.	None	None	[IT 1988b]

Table 2.4 Site 4 - Results of Previous Investigations (continued)

Investigation and Investigator	Air Investigation and Significant Analytical Results	Soil Investigation and Significant Analytical Results	Groundwater Investigation and Significant Analytical Results	Other Activities	References
IRP, Site Inspection - IT Corporation	None	Evaluated all geologic and chemical data relating to environmental contamination at Mather AFB. No sampling or analysis conducted.	Evaluated all geologic and chemical data relating to environmental contamination at Mather AFB. Data from 1988 groundwater sampling was included. Conducted two rounds of water level measurements for all on-base monitoring wells.	None	[IT 1990a]
Group 2 Sites Remedial Investigation - IT Corporation	Integrated surface air samples collected from five grid locations. Maximum detected contaminant concentration were: benzene (1.5 ppb); methylene chloride (2.6 ppb); and 1,1,1-TCA (0.89 ppb).	<p>Eight DSBs (DSB-A-4A through DSB-A-4H) were drilled and sampled (83 samples). Maximum contaminant concentration found were: chlorobenzene (0.18 ppm); diesel (10 ppm); gasoline (<10 ppm); ethylbenzene (0.14 ppm); and oil and grease (480 ppm). All metals were below TTCs.</p> <p>Four surface soil samples (SS-4A through SS-4D) were collected and analyzed. Maximum contaminant concentrations found were: toluene (0.005 ppm); gasoline (<10 ppm); diesel (<10 ppm); 2-butanone ((J)0.01 ppm); and oil and grease (150 ppm).</p> <p>Six sediment samples (SD-4A through SD-4D) were collected and analyzed. Maximum contaminant concentrations detected were: toluene (0.008 ppm); ethylbenzene (<0.005 ppm); diesel (<10 ppm); 2-butanone ((J)0.013 ppm); and gasoline (<10 ppm).</p>	<p>Groundwater samples were collected from well MAFB-5 and analyzed for target analytes. Contaminant concentrations detected were: TCE (1.9 ppb); PCE (7.5 ppb); toluene (1.8 ppb); xylenes (1.8 ppb); benzene (1.3 ppb); and DCE (7.8 ppb).</p> <p>Three surface water samples (SW-4A, SW-4B, and SW-4F) were collected and analyzed. Maximum contaminant concentrations detected were: diesel (50 ppb); and total lead (3.6 ppb). All inorganics were below MCLs.</p>	None	[IT 1993c]

Table 2.4 Site 4 - Results of Previous Investigations (continued)

Investigation and Investigator	Air Investigation and Significant Analytical Results	Soil Investigation and Significant Analytical Results	Groundwater Investigation and Significant Analytical Results	Other Activities	References
Landfill OU Focused Feasibility Study - IT Corporation	None	<p>Two CWs (CW-401 and 402) and three MWs (MW-401, 402 and 403) were installed and sampled for methane. Six existing wells (MW-26 through MW-29 and CW-24 and 25) were also sampled for methane. None of the perimeter MWs detected methane. The maximum detected methane concentration was 46% in CW-401.</p> <p>Ten soil samples were collected during drilling of Wells CW-401 and CW-402 and analyzed for geotechnical parameters. Additionally, three surface bulk samples were collected for geotechnical analyses.</p> <p>Ten trenches (TR4-1 through TR4-10) were excavated to assess the lateral extent of refuse in the landfill. Four of the trenches (TR4-1 through TR4-4) encountered refuse. TR4-3 showed evidence of burned refuse.</p>	None	An area-wide geophysical survey was conducted to identify the extent of refuse. Detected anomalies were investigated with trenches TR4-1, and TR4-3 through TR4-10.	[IT 1993c]

None - media not investigated
 STLC - soluble threshold limit concentration
 MW - landfill gas migration well
 TCE - trichloroethylene
 DCE - dichloroethylene
 TCA - trichloroethane
 PCE - tetrachloroethylene
 THC - total hydrocarbon content
 MCL - maximum contaminant level
 DCB - dichlorobenzene
 OU - operable unit
 J- estimated value

AFB - Air Force Base
 CW - landfill gas characterization well
 ppm - parts per million
 SWAT - Solid Waste Assessment Test
 DSB - deep soil boring
 VOC - volatile organic compound
 TTLC - total threshold limit concentration
 IRP - Installation Restoration Program
 GPR - ground penetrating radar
 PCB - polychlorinated biphenyl
 ppb - parts per billion

Table 2.5 Site 5 - Results of Previous Investigations

Investigation and Investigator	Air Investigation and Significant Analytical Results	Soil Investigation and Significant Analytical Results	Groundwater Investigation and Significant Analytical Results	Other Activities	References
IRP Phase I, Records Search - CH2M-Hill	None	None	None	Base Records Search	[CH2M-Hill 1982]
IRP Phase II, Stage 2 Investigation - AeroVironment, Inc.	None	Conducted GPR and terrain conductivity surveys.	Installed and sampled two wells: MAFB-22 and MAFB-23. No significant contaminants were detected in Well MAFB-22. Maximum contaminant concentrations detected were: DCE (0.9 ppb); PCE (1.3 ppb); 1,2-DCP (6.1 ppb); and DCA (0.75 ppb) in well MAFB-23.	None	[AeroVironment 1987]
Well Redevelopment and Sampling - IT Corporation	None	None	No significant contamination detected in Well MAFB-22. Well MAFB-23 was not redeveloped or sampled due to well damage.	None	[IT 1990b]
Quarterly Routine Groundwater Sampling - IT Corporation and EA Engineering, Science and Technology, Inc.	None	None	Data for selected constituents were summarized in the Quarterly Groundwater Monitoring Reports. See Table 2.11 for a summary of quarterly data for selected analytes.	None	[EA 1990a] [EA 1990b] [EA 1990c] [IT 1993a] [IT 1993b]
Landfill Gas Testing - IT Corporation	None	Installed and sampled one CW (CW-30) and two MWs (MW-31 and MW-32). Detected TCE (18 ppb); PCE (6.2 ppb); and benzene (240 ppb). Methane was detected in Well CW-30 at 37%	None	None	[IT 1988b]
IRP, Site Inspection - IT Corporation	None	Evaluated all geologic and chemical data relating to environmental contamination at Mather AFB. No sampling or analysis conducted.	Evaluated all geologic and chemical data relating to environmental contamination at Mather AFB. Data from 1988 groundwater sampling was included. Conducted two rounds of water level measurements for all on-base monitoring wells.	None	[IT 1990a]

Table 2.5 Site 5 - Results of Previous Investigations (continued)

Investigation and Investigator	Air Investigation and Significant Analytical Results	Soil Investigation and Significant Analytical Results	Groundwater Investigation and Significant Analytical Results	Other Activities	References
Group 2 Sites Remedial Investigation - IT Corporation	Integrated surface air samples collected from two grid locations. Maximum detected contaminant concentrations were: benzene (0.45 ppb) and methylene chloride (1.0 ppb).	<p>Three DSBs (DSB-A-5A through DSB-A-5C) were drilled and sampled (30 samples). Maximum contaminant concentrations found were: gasoline (<10 ppm) and oil and grease (66 ppm). Detected inorganics were below TTLCs.</p> <p>Two surface soil samples (SS-A-5A and SS-A-5B) were collected and analyzed. Maximum contaminant concentrations found were: toluene (<0.005 ppm); diesel (<10 ppm); and oil and grease (94 ppm). Inorganic constituents were detected at levels below TTLCs.</p> <p>One sediment sample (SD-5A) was collected and analyzed. Contaminant concentrations found were: toluene (<0.005 ppm) and gasoline (<10 ppm). Inorganic constituents were detected at levels below TTLCs.</p>	<p>Groundwater samples were collected from Wells MAFB-139 and MAFB-141 and analyzed for target analytes. Maximum concentrations detected were: 1,1-DCA (<0.5 ppb); TCE (0.6 ppb); chloromethane (0.9 ppb); and 1,2-DCP (4.2 ppb).</p> <p>One surface water sample (SW-5A) was collected and analyzed. Contaminant concentrations found were: diesel (60 ppb) and total lead (4.3 ppb). Inorganic constituents were detected at levels below MCLs.</p>	None	[IT 1993c]
Solid Waste Assessment Report - IT Corporation	None	None	Four quarters (1991) of sampling for SWAT metals and VOCs were conducted in Wells MAFB-139, 140, and 141. Maximum contaminant levels were: 1,1-DCA (0.7 ppb); 1,2-DCP (5.8 ppb); chloroform (<0.5 ppb); chloromethane (0.9 ppb); methylene chloride (0.5 ppb); PCE (0.5 ppb); TCE (1.1 ppb); and DCE (<0.5 ppb). All detected inorganic constituents were below established STLCS and MCLs.	None	[IT 1993d]

Table 2.5 Site 5 - Results of Previous Investigations (continued)

Investigation and Investigator	Air Investigation and Significant Analytical Results	Soil Investigation and Significant Analytical Results	Groundwater Investigation and Significant Analytical Results	Other Activities	References
Landfill OU Focused Feasibility Study - IT Corporation	None	<p>One CW (CW-501) and four MWs (MW-501 through MW-504) were installed and sampled for methane. Three existing wells (MW-31, MW-32, and CW-30) were also sampled for methane. None of the perimeter MWs detected methane. The maximum detected methane concentration was 29% (CW-30).</p> <p>Six soil samples were collected during drilling of Well CW-501 and analyzed for geotechnical parameters. Additionally, three surface bulk samples were collected for geotechnical analyses.</p> <p>Twelve trenches (TR5-1 through TR5-4 and TR5-2A through TR5-2H) were excavated to assess the lateral extent of the refuse in the landfills. All trenches, except trenches TR5-2G and 2H, encountered refuse with little or no evidence of burning. Trenches showed the eastward extent of refuse extent was greater than expected.</p>	None	An area-wide geophysical survey was conducted to identify the extent of refuse. Detected anomalies were investigated with trenches TR5-1 through TR5-4.	[IT 1993e]

None - media not investigated	AFB - Air Force Base
STLC - soluble threshold limit concentration	CW - landfill gas characterization well
MW - landfill gas migration well	ppm - parts per million
TCE - trichloroethylene	SWAT - Solid Waste Assessment Test
DCE - dichloroethylene	DSB - deep soil boring
TCA - trichloroethane	VOC - volatile organic compound
PCE - tetrachloroethylene	TTLC - total threshold limit concentration
THC - total hydrocarbon content	IRP - Installation Restoration Program
MCL - maximum contaminant level	DCP - dichloropropane
DCA - dichloroethane	GPR - ground penetrating radar
OU - operable unit	ppb - parts per billion

Table 2.6 Site 6 - Results of Previous Investigations

Investigation and Investigator	Air Investigation and Significant Analytical Results	Soil Investigation and Significant Analytical Results	Groundwater Investigation and Significant Analytical Results	Other Activities	References
IRP Phase I, Records Search - CH2M-Hill	None	None	None	Base Records Search	[CH2M-Hill 1982]
IRP Phase II, Stage 2 Investigation - AeroVironment, Inc.	None	None	Three shallow wells were installed and sampled (MAFB-28, 29, and 30). No significant contaminants detected.	None	[AeroVironment 1987]
Well Redevelopment and Sampling - IT Corporation	None	None	No significant contamination was detected in Wells MAFB-28, -29, or -30.	None	[IT 1990b]
Quarterly Routine Groundwater Sampling - IT Corporation and EA Engineering, Science and Technology, Inc.	None	None	Data for selected constituents were summarized in the Quarterly Groundwater Monitoring Reports. See Table 2.12 for a summary of quarterly data for selected analytes.	None	[EA 1990a] [EA 1990b] [EA 1990c] [IT 1993a] [IT 1993b]
Landfill Gas Testing - IT Corporation	None	Two CWs (CW-33 and CW-34) and four MWs (MW-35 through MW-38) were installed and sampled. Maximum contaminant concentrations found were: vinyl chloride (1500 ppb), TCE (3400 ppb); PCE (140 ppb); benzene (1300 ppb); 1,1,1-TCA (5.5 ppb); and THC (2800 ppm). Methane was detected in Wells CW-33 and CW-34 at 50% and 49%, respectively.	None	None	[IT 1988b]
IRP, Site Inspection - IT Corporation	None	Evaluated all geologic and chemical data relating to environmental contamination at Mather AFB. No sampling or analysis conducted.	Evaluated all geologic and chemical data relating to environmental contamination at Mather AFB. Data from 1988 groundwater sampling was included. Conducted two rounds of water level measurements for all on-base monitoring wells.	None	[IT 1990a]

Table 2.6 Site 6 - Results of Previous Investigations (continued)

Investigation and Investigator	Air Investigation and Significant Analytical Results	Soil Investigation and Significant Analytical Results	Groundwater Investigation and Significant Analytical Results	Other Activities	References
Group 2 Sites Remedial Investigation - IT Corporation	Integrated surface air samples collected from five grid locations. Maximum contaminant concentrations found: benzene (1.4/ND ppb); methylene chloride (3.2/44 ppb); PCE (0.49/2.0 ppb); and 1,1,1-TCA (1.3/10 ppb).	<p>Eight DSBs (DSB-A-6A through DSB-A-6H) were drilled and sampled (100 samples). Maximum contaminant concentrations found: 1,2-DCB (1 ppm); gasoline (10 ppm); 1,4-DCB (0.15 ppm); 4,4-DDD (54 ppb); 4,4-DDE (1527 ppb); MCB (0.05 ppm); ethylbenzene (0.18 ppm); xylenes (0.28 ppm); 4,4-DDT (625 ppb); oil and grease (4900 ppm); heptachlor epoxide (29 ppb); gamma-Chlordane (148 ppb); and diesel (4440 ppm). All detected inorganics were below TTLCs.</p> <p>Four surface soil samples (SS-6A through SS-6D) were collected and analyzed. Maximum contaminant concentrations found were: diesel ((J)120 ppm) and oil and grease (2300 ppm). All detected inorganics were below TTLCs.</p> <p>Original landfill gas wells (CW-33, CW-34, MW-35, and MW-36) were sampled. Wells MW-37 and 38 were not sampled due to missing well caps. Maximum detected contaminant concentrations were: vinyl chloride (1200 ppb); benzene (1200 ppb); TCE (250 ppb); and methane (61 percent).</p> <p>Sediment samples SD-6A, SD-6B, and SD-6C were collected and analyzed. Only inorganic constituents were detected; all of which were below TTLCs.</p>	<p>Groundwater samples were collected from Wells MAFB-28, 142, 143, and 144 and analyzed. Maximum contaminant concentrations detected were: TPH diesel (<500 ppb); oil and grease (<5000 ppb); total lead (22.4 ppb); and benzyl chloride (0.5 ppb). No detectable constituents were detected in Well MAFB-28.</p> <p>Three surface water samples (SW-6A through SW-6C) were collected and analyzed. Maximum contaminant concentrations were: diesel (50 ppb) and total lead (9.3 ppb). All detected inorganics were below drinking water MCLs.</p>	None	[IT 1993c]

Table 2.6 Site 6 - Results of Previous Investigations (continued)

Investigation and Investigator	Air Investigation and Significant Analytical Results	Soil Investigation and Significant Analytical Results	Groundwater Investigation and Significant Analytical Results	Other Activities	References
Landfill OU Focused Feasibility Study - IT Corporation	None	<p>Two CWs (CW-601 and 602) and ten MWs (MW-601 through MW-610) were installed and sampled for methane. Two existing wells (CW-33 and 34) were also sampled for methane. None of the perimeter MWs detected methane. The maximum methane concentration detected was 53% (CW-33).</p> <p>Eight soil samples were collected during drilling of wells CW-601 and CW-602 and analyzed for geotechnical parameters. Additionally, three bulk soil samples were collected for geotechnical analyses.</p> <p>Ten trenches were excavated (TR6-1 through TR6-10) to assess the lateral extent of the refuse in the landfills. Seven of the trenches encountered refuse with little or no evidence of burning.</p>	None	An area-wide geophysical survey was conducted to identify the extent of refuse. Detected anomalies were investigated with trenches TR6-1 through TR6-10.	[IT 1993e]

None - media not investigated
 STLC - soluble threshold limit concentration
 MW - landfill gas migration well
 SWAT - Solid Waste Assessment Test
 TCA - trichloroethane
 TTLC - total threshold limit concentration
 MCL - maximum contaminant level
 DDT - dichlorodiphenyltrichloroethane
 TPH - total petroleum hydrocarbon
 PCB - polychlorinated biphenyl

AFB - Air Force Base
 CW - landfill gas characterization well
 ppm - parts per million
 DCE - dichloroethylene
 VOC - volatile organic compound
 THC - total hydrocarbon content
 DDD - dichlorodiphenyldichloroethane
 GPR - ground penetrating radar
 ND - not detected
 OU - operable unit

xx/yy - sample original/QC field duplicate
 ppb - parts per billion
 TCE - trichloroethylene
 DSB - deep soil boring
 PCE - tetrachloroethylene
 IRP - Installation Restoration Program
 DDE - dichlorodiphenyldichloroethylene
 DCB - dichlorobenzene
 MCB - monochlorobenzene
 J- estimated value

**Table 2.7 Site 1 - Quarterly Sampling
Results for Selected Analytes**

Well Number	Date Sampled	Total Petroleum Hydrocarbons (ppb)	TCE (ppb)	PCE (ppb)	Carbon Tetrachloride (ppb)	Lead (ppb)
MAFB-125	5/91	ND	3.2	0.9	ND	ND
	7/91	ND	1.8	0.9	ND	4.9
	10/91	ND	ND	0.8	ND	3.2
	2/92	ND	2.2	1.0	ND	ND
	4/92	ND	2.6	1.3	ND	ND
	7/92	ND	2.0	0.7	ND	ND
	10/92	ND	1.9	0.7	ND	ND
	2/93	NS	NS	NS	NS	NS
	5/93	NP	2.1	0.7	ND	ND
	7/93	NS	NS	NS	NS	NS
	10/93	NP	1.5	ND	ND	ND
	1/94	NS	NS	NS	NS	NS
	4/94	NP	2.4	0.74	ND	NP
MAFB-126	5/91	ND	1.0	3.0	ND	ND
	7/91	ND	0.8	3.0	ND	ND
	10/91	ND	ND	3.4	ND	ND
	2/92	ND	1.6	6.2	ND	2.3
	4/92	ND	0.6	2.7	ND	2.2
	7/92	ND	ND	2.2	ND	ND
	10/92	ND	1.0	4.7	ND	ND
	2/93	NS	NS	NS	NS	NS
	5/93	NP	0.8	4.6	ND	ND
	7/93	NS	NS	NS	NS	NS
	10/93	NS	NS	NS	NS	NS
	1/94	NS	NS	NS	NS	NS
	4/94	NP	0.99	4.8	ND	NP

ND - not detected
 NP - not analyzed for parameter
 N/A - not applicable
 NS - not sampled
 ppb - parts per billion
 TCE - trichloroethylene
 PCE - tetrachloroethylene

**Table 2.8 Site 2 - Quarterly Sampling
Results for Selected Analytes**

Well Number	Date Sampled	Total Petroleum Hydrocarbons (ppb)	TCE (ppb)	PCE (ppb)	Carbon Tetrachloride (ppb)	Lead (ppb)
MAFB-18	10/89	ND	ND	ND	ND	18.9
	2/90	ND	ND	ND	ND	3.2
	6/90	ND	ND	ND	ND	4.0
	8/90	ND	ND	ND	ND	ND
	11/90	ND	ND	ND	ND	5.8
	3/91 - 10/91	ND	ND	ND	ND	ND
	2/92	ND	ND	ND	ND	1.0
	4/92	ND	ND	ND	ND	1.6
	7/92	ND	ND	ND	ND	ND
	10/92	N/A	N/A	N/A	N/A	N/A
	2/93	NS	NS	NS	NS	NS
	4/93	NP	NP	NP	NP	ND
	7/93	NS	NS	NS	NS	NS
	10/93	NP	NP	NP	NP	NP
	1/94	NS	NS	NS	NS	NS
	5/94	NP	ND	ND	ND	ND
MAFB-127	5/91	60.0 (diesel)	ND	ND	ND	ND
	8/91 - 2/92	ND	ND	ND	ND	ND
	4/92	ND	ND	ND	ND	5.7
	8/92 11/92	ND	ND	ND	ND	ND
	2/93	NS	NS	NS	NS	NS
	5/93	NP	ND	ND	ND	NP
	7/93	NS	NS	NS	NS	NS
	10/93	NS	NS	NS	NS	NS
	1/94	NS	NS	NS	NS	NS
	5/94	NP	ND	ND	ND	NP
MAFB-128	5/91 - 10/91	ND	ND	ND	ND	ND
	2/92	ND	ND	ND	ND	1.6
	4/92 - 11/92	ND	ND	ND	ND	ND
	2/93	NS	NS	NS	NS	NS
	4/93	NP	NP	NP	NP	ND
	7/93	NS	NS	NS	NS	NS
	10/93	NP	NP	NP	NP	ND
	1/94	NS	NS	NS	NS	NS
	5/94	NP	ND	ND	ND	NP
MAFB-129	6/91 - 2/92	ND	ND	ND	ND	ND
	4/92	ND	ND	ND	ND	1.2
	8/92 - 11/92	ND	ND	ND	ND	ND
	2/93	NS	NS	NS	NS	NS
	5/93	NP	ND	ND	ND	NP
	7/93	NS	NS	NS	NS	NS
	10/93	NP	ND	ND	ND	NP
	1/94	NS	NS	NS	NS	NS
	5/94	NP	ND	ND	ND	NP

ND - not detected
 NP - not analyzed for parameter
 N/A - not applicable
 NS - not sampled
 ppb - parts per billion
 TCE - trichloroethylene
 PCE - tetrachloroethylene

**Table 2.9 Site 3 - Quarterly Sampling
Results for Selected Analytes**

Well Number	Date Sampled	Total Petroleum Hydrocarbons (ppb)	TCE (ppb)	PCE (ppb)	Carbon Tetrachloride (ppb)	Lead (ppb)
MAFB-24	10/89	ND	1.0	3.0	ND	51.9
	2/90	ND	ND	2.9	ND	2.9
	5/90	ND	ND	2.2	ND	4.0
	8/90 - 4/93	N/A	N/A	N/A	N/A	N/A
	7/93	N/A	N/A	N/A	N/A	N/A
	10/93	N/A	N/A	N/A	N/A	N/A
	2/94	N/A	N/A	N/A	N/A	N/A
	4/94	N/A	N/A	N/A	N/A	N/A
MAFB-26	10/89	ND	1.4	5.4	ND	2.4
	2/90	ND	ND	ND	ND	3.8
	5/90 - 11/90	ND	ND	ND	ND	ND
	3/91 - 11/92	N/A	N/A	N/A	N/A	N/A
	2/93	NS	NS	NS	NS	NS
	5/93	N/A	N/A	N/A	N/A	N/A
	7/93	N/A	N/A	N/A	N/A	N/A
	10/93	N/A	N/A	N/A	N/A	N/A
	2/94	N/A	N/A	N/A	N/A	N/A
	4/94	N/A	N/A	N/A	N/A	N/A
MAFB-100	5/91	100 (diesel)	ND	ND	ND	ND
	8/91 - 3/92	ND	ND	ND	ND	ND
	4/92	ND	ND	ND	ND	1.3
	8/92 - 10/92	ND	ND	ND	ND	ND
	2/93	NS	NS	NS	NS	NS
	5/93	NP	ND	ND	ND	NP
	7/93	NS	NS	NS	NS	NS
	10/93	NS	NS	NS	NS	NS
	1/94	NS	NS	NS	NS	NS
	5/94	NP	ND	ND	ND	NP
MAFB-111	6/91	ND	0.6	4.7	ND	ND
	8/91	ND	7.5	4.0	ND	ND
	10/91	ND	ND	3.1	ND	ND
	2/92	ND	ND	4.2	ND	11.9
	4/92	ND	ND	4.3	ND	1.5
	7/92	ND	ND	3.5	ND	ND
	10/92	ND	ND	2.4	ND	ND
	2/93	NS	NS	NS	NS	NS
	5/93	NP	ND	3.5	ND	ND
	7/93	NS	NS	NS	NS	NS
	10/93	NS	NS	NS	NS	NS
	1/94	NS	NS	NS	NS	NS
	5/94	NP	1.1	9.7	ND	NP

**Table 2.9 Site 3 - Quarterly Sampling
Results for Selected Analytes (continued)**

Well Number	Date Sampled	Total Petroleum Hydrocarbons (ppb)	TCE (ppb)	PCE (ppb)	Carbon Tetrachloride (ppb)	Lead (ppb)
MAFB-112	5/91	ND	ND	1.8	ND	ND
	8/91	ND	ND	1.8	ND	ND
	10/91	ND	ND	2.4	ND	ND
	2/92	ND	0.5	3.9	ND	ND
	4/92	ND	0.6	3.8	ND	ND
	7/92	1330 (diesel)	ND	3.0	ND	ND
	10/92	ND	0.6	3.7	ND	ND
	2/93	NS	NS	NS	NS	NS
	4/93	NP	ND	3.8	ND	NP
	7/93	NS	NS	NS	NS	NS
	10/93	NP	ND	3.5J	ND	NP
	1/94	NS	NS	NS	NS	NS
	5/94	ND	0.52	3.8	ND	NP
MAFB-113	5/91 - 8/91	ND	ND	ND	ND	ND
	10/91	N/A	N/A	N/A	N/A	N/A
	2/92	ND	ND	ND	ND	ND
	4/92	ND	ND	ND	ND	1.8
	7/92 - 4/93	N/A	N/A	N/A	N/A	N/A
	7/93	N/A	N/A	N/A	N/A	N/A
	10/93	N/A	N/A	N/A	N/A	N/A
	1/94	NS	NS	NS	NS	NS
	4/94	N/A	N/A	N/A	N/A	N/A
MAFB-114	5/91 - 4/94	N/A	N/A	N/A	N/A	N/A

**Table 2.9 Site 3 - Quarterly Sampling
Results for Selected Analytes (continued)**

Well Number	Date Sampled	Total Petroleum Hydrocarbons (ppb)	TCE (ppb)	PCE (ppb)	Carbon Tetrachloride (ppb)	Lead (ppb)
MAFB-130	5/91	ND	ND	1.4	ND	ND
	8/91	ND	ND	1.1	ND	ND
	10/91	ND	ND	1.3	ND	ND
	2/92	ND	ND	1.7	ND	ND
	4/92	ND	ND	2.0	ND	2.0
	7/92	ND	ND	2.9	ND	ND
	10/92	ND	ND	2.1	ND	ND
	2/93	NS	NS	NS	NS	NS
	4/93	NP	ND	3.9	ND	NP
	7/93	NS	NS	NS	NS	NS
	10/93	NP	0.5	4.5	ND	NP
	1/94	NS	NS	NS	NS	NS
	4/94	NP	1.2	8.3	ND	NP
MAFB-131	5/91	ND	ND	ND	ND	ND
	8/91	ND	ND	1.5	ND	ND
	10/91	ND	ND	1.2	ND	ND
	2/92	ND	ND	1.0	ND	8.6
	4/92	ND	ND	0.7	ND	2.3
	7/92	ND	ND	0.8	ND	3.0
	10/92	ND	ND	0.6	ND	ND
	2/93	NS	NS	NS	NS	NS
	4/93	NP	ND	ND	ND	ND
	7/93	NS	NS	NS	NS	NS
	10/93	NP	ND	ND	ND	3.0
	1/94	NS	NS	NS	NS	NS
	4/94	NP	ND	ND	ND	ND
MAFB-133	5/91	ND	ND	2.4	ND	ND
	8/91	ND	0.5	2.6	ND	ND
	10/91	ND	ND	4.7	ND	ND
	2/92	ND	1.6	11.0	ND	ND
	4/92	ND	1.5	8.8	ND	1.8
	7/92	ND	2.4	16.0	ND	ND
	10/92	ND	3.0	11.0	ND	ND
	2/93	NS	NS	NS	NS	NS
	4/93	NP	NP	NP	NP	ND
	7/93	ND	1.9J	10J	ND	ND
	10/93	ND	1.7J	9.1	ND	ND
	1/94	NS	NS	NS	NS	NS
	4/94	NP	2.5	13	ND	NP

ND - not detected
 NP - not analyzed for parameter
 N/A - not applicable
 NS - not sampled
 ppb - parts per billion
 J - estimated value
 TCE - trichloroethylene
 PCE - tetrachloroethylene

**Table 2.10 Site 4 - Quarterly Sampling
Results for Selected Analytes**

Well Number	Date Sampled	Total Petroleum Hydrocarbons (ppb)	TCE (ppb)	PCE (ppb)	Carbon Tetrachloride (ppb)	Lead (ppb)
MAFB-5	10/89	ND	ND	1.2	ND	3.9
	2/90	ND	ND	1.8	ND	4.4
	6/90	N/A	1.1	0.9	ND	9.0
	8/90	ND	ND	0.8	ND	23.0
	11/90	ND	ND	0.6	ND	4.1
	3/91	ND	ND	1.1	ND	ND
	5/91	ND	ND	1.1	ND	ND
	8/91	ND	ND	0.6	ND	ND
	11/91	ND	ND	1.0	ND	ND
	3/92	ND	ND	0.6	ND	ND
	5/92	ND	ND	ND	ND	1.0
	8/92	ND	ND	ND	ND	ND
	11/92	ND	ND	1.1	ND	ND
	2/93	NS	NS	NS	NS	NS
	4/93	NP	ND	ND	ND	ND
	7/93	NS	NS	NS	NS	NS
	10/93	NP	ND	ND	ND	ND
	1/94	NS	NS	NS	NS	NS
	4/94	NP	ND	0.61	ND	NP
MAFB-75	10/89	ND	ND	0.5	ND	2.5
	2/90	ND	ND	ND	ND	3.4
	5/90	ND	ND	1.6	ND	ND
	8/90	ND	ND	ND	ND	15.0
	11/90	ND	ND	ND	ND	13.6
	3/91 - 11/91	ND	ND	ND	ND	ND
	3/92	ND	ND	ND	ND	1.0
	4/92	ND	ND	ND	ND	2.5
	8/92	ND	ND	ND	ND	ND
	11/92	ND	ND	ND	ND	2.9
	2/93	NS	NS	NS	NS	NS
	4/93	NP	NP	NP	NP	NP
	7/93	NS	NS	NS	NS	NS
	10/93	NS	NS	NS	NS	NS
	1/94	NS	NS	NS	NS	NS
	4/94	NP	NP	NP	NP	ND
MAFB-76	10/89	ND	ND	ND	ND	25.2
	2/90	ND	ND	ND	ND	4.5
	5/90	ND	ND	ND	ND	12.0
	8/90	ND	ND	ND	ND	71.0
	11/90 - 11/91	ND	ND	ND	ND	ND
	3/92	ND	ND	ND	ND	2.0
	4/92	ND	ND	ND	ND	2.0
	8/92	ND	ND	ND	ND	ND
	11/92	N/A	N/A	N/A	N/A	N/A
	2/93	NS	NS	NS	NS	NS
	4/93	N/A	N/A	N/A	N/A	N/A
	7/93	NS	NS	NS	NS	NS
	10/93	NS	NS	NS	NS	NS
	1/94	NS	NS	NS	NS	NS
	4/94	NS	NS	NS	NS	NS

**Table 2.10 Site 4 - Quarterly Sampling
Results for Selected Analytes (continued)**

Well Number	Date Sampled	Total Petroleum Hydrocarbons (ppb)	TCE (ppb)	PCE (ppb)	Carbon Tetrachloride (ppb)	Lead (ppb)
MAFB-135	5/91 - 11/91	ND	ND	ND	ND	ND
	2/92	ND	ND	ND	ND	1.0
	4/92	ND	ND	ND	ND	1.0
	8/92 - 10/92	ND	ND	ND	ND	ND
	2/93	NS	NS	NS	NS	NS
	4/93	NP	NP	NP	NP	ND
	7/93	NS	NS	NS	NS	NS
	10/93	NS	NS	NS	NS	NS
	1/94	NS	NS	NS	NS	NS
	4/94	NP	ND	ND	ND	NP
MAFB-136	5/91	ND	1.9	7.5	ND	ND
	8/91	ND	0.8	3.8	ND	ND
	11/91	ND	ND	1.6	ND	ND
	3/92	ND	ND	2.2	ND	1.5
	4/92	ND	ND	2.3	ND	ND
	8/92	ND	ND	1.4	ND	ND
	10/92	ND	0.6	2.2	ND	ND
	2/93	NS	NS	NS	NS	NS
	4/93	NP	0.6	4.3	ND	ND
	7/93	NS	NS	NS	NS	NS
	10/93	NP	0.6	2.7	ND	4.4
	1/94	NS	NS	NS	NS	NS
	4/94	NP	1.2	5.9	ND	ND
MAFB-137	5/91	60 (diesel)	ND	ND	ND	ND
	8/91 - 11/91	ND	ND	ND	ND	ND
	3/92	ND	ND	ND	ND	1.3
	5/92	ND	ND	ND	ND	2.2
	8/92 - 10/92	ND	ND	ND	ND	ND
	2/93	NS	NS	NS	NS	NS
	4/93	NP	ND	ND	ND	3.5
	7/93	NS	NS	NS	NS	NS
	10/93	NS	NS	NS	NS	NS
	1/94	NS	NS	NS	NS	NS
	4/94	NP	ND	ND	ND	ND

ND - not detected
 NP - not analyzed for parameter
 N/A - not applicable
 NS - not sampled
 ppb - parts per billion
 TCE - trichloroethylene
 PCE - tetrachloroethylene

**Table 2.11 Site 5 - Quarterly Sampling
Results for Selected Analytes**

Well Number	Date Sampled	Total Petroleum Hydrocarbons (ppb)	TCE (ppb)	PCE (ppb)	Carbon Tetrachloride (ppb)	Lead (ppb)
MAFB-22	10/89	ND	ND	ND	ND	24.0
	2/90	ND	ND	ND	ND	9.2
	5/90	ND	ND	ND	ND	85.0
	8/90 - 11/90	N/A	N/A	N/A	N/A	N/A
	3/91	90.0 (diesel)	ND	ND	ND	3.7
	5/91 - 11/92	N/A	N/A	N/A	N/A	N/A
	2/93	NS	NS	NS	NS	NS
	4/93	N/A	N/A	N/A	N/A	N/A
	7/93	NS	NS	NS	NS	NS
	10/93	N/A	N/A	N/A	N/A	N/A
	1/94	NS	NS	NS	NS	NS
	4/94	N/A	N/A	N/A	N/A	N/A
MAFB-138	5/91	ND	ND	ND	ND	2.0
	8/91 - 2/92	ND	ND	ND	ND	ND
	4/92	ND	ND	ND	ND	3.2
	8/92 - 10/92	ND	ND	ND	ND	ND
	2/93 - 4/93	NS	NS	NS	NS	NS
	7/93	NS	NS	NS	NS	NS
	10/93	NS	NS	NS	NS	NS
	1/94	NS	NS	NS	NS	NS
	4/94	NS	NS	NS	NS	NS
MAFB-139	5/91	ND	0.6	ND	ND	ND
	8/91 - 2/92	ND	ND	ND	ND	ND
	4/92	ND	0.5	ND	ND	1.4
	8/92 - 10/92	ND	ND	ND	ND	ND
	2/93	NS	NS	NS	NS	NS
	4/93	NP	ND	ND	ND	NP
	7/93	NS	NS	NS	NS	NS
	10/93	NP	ND	ND	ND	NP
	1/94	NS	NS	NS	NS	NS
	4/94	NP	ND	ND	ND	NP
MAFB-140	5/91	ND	ND	ND	ND	ND
	8/91	ND	ND	ND	ND	24.6
	11/91 - 2/92	ND	ND	ND	ND	ND
	4/92	ND	ND	ND	ND	2.3
	8/92 - 10/92	ND	ND	ND	ND	ND
	2/93 - 4/93	NS	NS	NS	NS	NS
	7/93	NS	NS	NS	NS	NS
	10/93	NS	NS	NS	NS	NS
	1/94	NS	NS	NS	NS	NS
	4/94	NP	ND	ND	ND	NP
MAFB-141	5/91 - 2/92	ND	ND	ND	ND	ND
	4/92	ND	ND	ND	ND	2.2
	8/92 - 10/92	ND	ND	ND	ND	ND
	2/93	NS	NS	NS	NS	NS
	4/93	NP	ND	ND	ND	NP
	7/93	NS	NS	NS	NS	NS
	10/93	NP	ND	ND	ND	NP
	1/94	NS	NS	NS	NS	NS
	4/94	NP	ND	ND	ND	NP

ND - not detected N/A - not applicable NS - not sampled NP - not analyzed for parameter
ppb - parts per billion TCE - trichloroethylene PCE - tetrachloroethylene

**Table 2.12 Site 6 - Quarterly Sampling
Results for Selected Analytes**

Well Number	Date Sampled	Total Petroleum Hydrocarbons (ppb)	TCE (ppb)	PCE (ppb)	Carbon Tetrachloride (ppb)	Lead (ppb)
MAFB-28	10/89	ND	ND	ND	ND	1.2
	2/90 - 8/90	ND	ND	ND	ND	ND
	11/90	ND	ND	ND	ND	10.0
	3/91 - 10/91	ND	ND	ND	ND	ND
	2/92	ND	ND	ND	ND	1.0
	4/92	ND	ND	ND	ND	1.2
	7/92 - 10/92	ND	ND	ND	ND	ND
	2/93	NS	NS	NS	NS	NS
	4/93	NP	NP	NP	NP	6.6
	7/93	NS	NS	NS	NS	NS
	10/93	NP	NP	NP	NP	ND
	1/94	NS	NS	NS	NS	NS
	4/94	NP	NP	NP	NP	ND
MAFB-142	5/91	ND	ND	ND	ND	7.0
	8/91 - 11/91	ND	ND	ND	ND	ND
	2/92	ND	ND	ND	ND	1.6
	4/92 - 10/92	ND	ND	ND	ND	ND
	2/93	NS	NS	NS	NS	NS
	5/93	NP	NP	NP	NP	ND
	7/93	NS	NS	NS	NS	NS
	10/93	NS	NS	NS	NS	NS
	1/94	NS	NS	NS	NS	NS
	4/94	NS	NS	NS	NS	NS
MAFB-143	5/91 - 4/92	ND	ND	ND	ND	ND
	7/92	ND	ND	ND	ND	8.2
	10/92	ND	ND	ND	ND	ND
	2/93 - 4/93	NS	NS	NS	NS	NS
	7/93	NS	NS	NS	NS	NS
	10/93	NS	NS	NS	NS	NS
	1/94	NS	NS	NS	NS	NS
	4/94	NP	NP	NP	NP	ND
MAFB-144	5/91 - 11/91	ND	ND	ND	ND	ND
	3/92	ND	ND	ND	ND	4.3
	4/92	ND	ND	ND	ND	1.3
	7/92	ND	ND	ND	ND	5.3
	10/92	ND	ND	ND	ND	ND
	2/93	NS	NS	NS	NS	NS
	4/93	NP	NP	NP	NP	ND
	7/93	NS	NS	NS	NS	NS
	10/93	NS	NS	NS	NS	NS
	1/94	NS	NS	NS	NS	NS
	4/94	NS	NS	NS	NS	NS

ND - not detected
 NP - not analyzed for parameter
 N/A - not applicable
 NS - not sampled
 ppb - parts per billion
 TCE - trichloroethylene
 PCE - tetrachloroethylene

2.3 Highlights of Community Participation

The Group 2 Sites RI Report which addresses the Landfill OU sites became available to the public at the Mather Environmental Management Office in April 1993 [IT 1993c]. The FFS for the Landfill OU Sites became available to the public at the Mather Environmental Management Office in December 1993 [IT 1993e]. The Group 2 Sites RI Report, FFS for the Landfill OU Sites, and Proposed Plan for the Landfill OU Sites were made available to the public in January 1994 in both the Administrative Record file and the information repositories maintained at the following locations:

- the Environmental Management Office, Mather AFB;
- the Sacramento Central Library;
- the Rancho Cordova Community Library; and
- the U.S. EPA Region IX Docket Room, San Francisco.

The notice of availability for the RI Report [IT 1993c], FFS Report [IT 1993e], and the Proposed Plan was published in the *Sacramento Bee* on the 17th and 27th of January 1994.

A public comment period was held from February 1, 1994 to March 3, 1994, to address the Proposed Plan and the content of the supporting RI/FS reports. A public meeting was held at the now inactive Mather AFB (Building 2460) on February 15, 1994. The public comment period and public meeting addressed the Proposed Plan.

Representatives from the USAF, U.S. EPA-Region IX, the California Regional Water Quality Control Board (RWQCB), the California Department of Toxic Substances Control (DTSC), and the California IWMB were present at the meeting.

Representatives from the USAF and regulatory agencies answered questions about the Landfill OU sites and the remedial alternatives under consideration. The Responsiveness Summary, Section 3.0 of this ROD, contains responses to questions from the public meeting and also documents comments received during the public comment period.

The public participation requirement of CERCLA Sections 113(k)(2)(B)(i-v) and 117 were met in the remedial alternative selections. This ROD presents the selected remedial actions for the Landfill OU Sites, Mather AFB, California, chosen in accordance with CERCLA (as amended by SARA) and to the extent practicable, the NCP. The decisions for these sites are based on the Administrative Record.

2.4 Scope and Role of Response Action

This ROD presents the planned response actions to address the primary concerns at the Landfill OU Sites posed by landfill contents. The purpose of the response actions is to prevent contact with the landfill contents and to comply with landfill closure requirements.

2.5 Summary of Site Characteristics

2.5.1 Summary of Hazardous Material Releases

In addition to garbage and household trash, it was reported that POL wastes, as well as waste solvents, primarily TCE, may have been disposed in the landfills. It has also been reported that daily burning of the refuse occurred at two of the landfills (Sites 3 and 4). The Landfill OU sites have been impacted by past waste disposal practices and consequently the soils are the affected medium at the sites. The objective of this ROD is to address the primary concerns at the Landfill OU sites posed by refuse, soil, and air (landfill gas) contamination. Any impact to the groundwater underlying the landfills will be addressed in a separate Groundwater OU ROD.

2.5.2 Nature and Extent of Contamination

Contamination exists at the Landfill OU sites as a result of past Air Force operations conducted between 1918 and 1974. The landfills were mainly used for the disposal of general and sanitary refuse. In addition to garbage and household trash, it was reported that POL wastes, as well as waste solvents, primarily TCE, may have been disposed in the landfills. It has also been reported that daily burning of the refuse occurred at two of the landfills (Sites 3 and 4).

Previous remedial investigations have been conducted at the Landfill OU sites as part of the Air Force IRP. The date, type of study, organization conducting the study, and results of the study are summarized and presented in Tables 2.1 through 2.6 for each of the Landfill OU sites.

2.6 Summary of Site Risks

The RI for Group 2 Sites [IT 1993c] included fate and transport modeling and a baseline risk assessment. The data collected and utilized in the RI and FFS were of U.S. EPA quality level III, IV, or V, or equivalent [EPA 1987]. Formal data validation of the

RI- and FFS-generated data was performed to ensure that data were of the quality commensurate with their intended use.

Although the sites are currently controlled by the Air Force, Mather AFB was decommissioned on September 30, 1993. Future land use is currently undecided.

2.6.1 Human Health Risks

2.6.1.1 Contaminant Identification

Remedial investigation data collected at the Landfill OU sites were used to identify the initial chemicals of potential concern (COPC). The list of initial COPCs was reduced using the following methods as prescribed by U.S. EPA guidance [EPA 1989b]:

- Quality Control Blank Contamination - As part of the data validation process, a chemical was not considered further if the maximum sample concentration did not exceed ten times the highest blank for all common laboratory contaminants (acetone, 2-butanone, methylene chloride, toluene, and phthalates) or five times the highest blank for other chemicals. This screening action reduces the inclusion of chemicals that are most likely sampling or analytical artifacts.
- Comparison with Background - Inorganic constituents present at naturally occurring background levels were eliminated. Specifically, a chemical was not considered further if the 95% upper confidence level (UCL) concentration was within the range of background sample concentrations.
- Frequency of Detection - Chemicals were eliminated if they were detected in 5% or less of the samples for the site. Infrequently detected chemicals may be artifacts of sampling, analytical, or other problems.
- Essential Nutrients - Iron, magnesium, calcium, sodium, potassium, phosphorus, sulfates, and carbonates are essential nutrients. These constituents are generally toxic only at very high doses and were eliminated because they were detected at levels below toxic concentrations.

**Table 2.13 Refined List of Chemicals of Potential Concern
and Affected Media at Landfill OU Sites from RI Baseline Risk Assessment [IT 1993c]**

Constituent	Site 2 Media	Site 3 Media	Site 4 Media	Site 5 Media	Site 6 Media
Acenaphthylene	○	SS	○	○	○
Benzene	A	A	A	A	A
2-Butanone	○	○	SS, Sed	○	○
Ethylbenzene	○	○	Sed	○	○
Methylene chloride	○	A, SuS	A	A	A, SuS
Tetrachloroethylene	○	A	○	○	A
Toluene	○	SS	SS, Sed	SS, Sed	○
1,1,1-Trichloroethane	○	A	A	○	A
4,4-DDE	○	SS	○	○	○
4,4-DDT	○	SS	○	○	○
Total Xylenes	○	SS	○	○	○
Aluminum	○	SuS	○	○	○
Antimony	○	○	○	○	SuS
Arsenic	○	SS	○	○	○
Barium	SuS	SS	SS, SuS, SW	SS, SuS, SW	SS, SuS, Sed, SW
Cadmium	SuS	○	○	SuS	SS, SuS
Chromium	○	SS	○	○	○
Chromium VI	○	SS, SuS	SS, Sed	SS, SuS, Sed	SS, Sed
Cobalt	SuS	○	SuS	SS, SuS	SuS, Sed
Copper	SuS	SS, SuS	SS, SuS, Sed	SS, SuS, Sed	SS, SuS, Sed
Lead	○	SS	SW	SW	SS, Sed, SW
Manganese	○	SS	SS, SuS, SW	SS, SuS, SW	Sed, SW
Molybdenum	○	SuS	SuS		Sed
Mercury	○	○	Sed	SuS	○
Nickel	SuS	SS, SuS	SS, SuS, Sed	SS, SuS, Sed	SS, Sed
Silver	○	SuS	SuS, Sed	SuS, Sed	SuS
Vanadium	○	○	○	SS	○
Zinc	SuS	SS, SuS	SS, SuS, Sed, SW	SS, SuS, Sed, SW	SS, SuS, Sed, SW

○ = Not a chemical of potential concern in media at site

A = Air

SS = Surface soil

SuS = Subsurface soil

Sed = Sediment

SW = Surface water

RI = remedial investigation

OU = operable unit

The COPCs remaining after this initial screening were further refined during the baseline health risk assessment. Table 2.13 presents this refined list of COPCs. Based upon the results of the baseline health risk assessment, the media of interest included:

- surface soils at Sites 3 and 6;
- air above Sites 2, 3, 4, 5, and 6 which may be impacted by the migration of VOCs; and
- groundwater beneath Sites 3 and 4 which was likely impacted by the migration of contaminants through the landfill.

As discussed in Section 2.1.5, all media except groundwater were evaluated in the FFS.

During the FFS, the refined list of COPCs from the baseline risk assessment was evaluated and further refined utilizing the following screening factors.

- Central Valley Regional Water Quality Board's (CVRWCQB) Designated Level Methodology (DLM) [CVRWCQB 1989];
- comparison to ARARs;
- process/disposal knowledge of the landfills; and
- risk assessment results.

2.6.1.1.1 *Designated Level Methodology*

The DLM was developed by the CVRWQCB [CVRWQCB 1989] and served as a screening of chemicals in the landfill soils and sediments to evaluate or estimate potential for impact to the groundwater. The application of this methodology consisted of the following steps.

- Determine the desired water quality goal for each constituent - Promulgated regulations and standards were used where available. In the absence of promulgated regulations, contaminant goals, health advisories, or risk-based dose rates were used as water quality goals.
- Determine an environmental attenuation factor for each constituent - This factor is used to transform water quality goals into site-specific designated levels (concentrations of constituents in the waste that have the potential to degrade water quality at the site of discharge). For purposes of

determining COPCs for this FFS, an environmental attenuation factor of 100 was used for most constituents as prescribed in the DLM guidance [CVRWQCB 1989]. A factor of 1000 was used for copper and zinc because these constituents tend to have a much greater than average degree of environmental attenuation.

- Determine a Soluble Designated Level - This level represents the concentration of a soluble constituent in the waste above which leachate would be able to carry them to ground or surface waters in amounts that would cause water quality goals to be exceeded in those waters. The soluble designated level is calculated by the following equation:

$$\text{Soluble Designated Level} = \frac{\text{Water Quality Goal} \times \text{Environmental Attenuation Factor}}{10}$$

The above divisor of 10 accounts for the ten-fold dilution of the waste extraction test (WET) results.

- Determine a Leachability Factor - This factor is used to determine the fraction of the total constituent concentration available for leaching from the waste and for uptake by organisms upon which the constituent would have a toxic or deleterious effect. For purposes of determining COPCs for this FFS, a leachability factor of 100 was used for inorganic constituents and 10 for organic constituents as prescribed in the DLM guidance [CVRWQCB 1989].
- Compare the Soluble Designated Level with WET Results - If a constituent's WET level is below the soluble designated level, the potential threat to groundwater is minimal. In addition, if the total concentration of a constituent in the waste is less than 10 times the soluble designated level, it would be impossible for the extractable constituent concentration from the WET to equal or exceed the soluble designated level. Constituents which met either of these conditions were eliminated from the list of COPCs.
- Determine a Total Designated Level - This level represents total concentration of a constituent in a solid waste or total or dissolved concentration of a constituent in a liquid waste which may threaten to degrade water quality if equalled or exceeded. The total designated level is calculated by the following equation:

$$\text{Total Designated Level} = \frac{\text{Water Quality Goal} \times \text{Leachability Factor}}{10}$$

The application of the DLM to the refined list of inorganic COPCs, resulting from the baseline health risk assessment, is presented in Tables 2.14 through 2.18.

2.6.1.1.2 Comparison to ARARs

No chemical-specific ARARs were identified for soils or sediments. Federal and State primary MCLs were compared to surface water and groundwater concentrations in the OU. While groundwater will be addressed as part of the Groundwater OU FFS, it was considered in this FFS as an indicator of contamination.

2.6.1.1.2.1 Surface Water

Table 2.19 presents the ARARs comparison for surface water. Manganese was the only chemical which exceeded the MCLs of 40 Code of Federal Regulations (CFR) Part 141 or the corresponding State of California requirements. This chemical is marked with an asterisk based on the probability of higher natural background concentrations in the area.

2.6.1.1.2.2 Groundwater

Table 2.20 presents the constituent concentrations in the groundwater underlying the landfills which exceed the ARARs. Two constituents at Site 3, cis-1,2-DCE and PCE, were elevated only slightly above their ARARs. Neither of these constituents were detected in the soil samples. Cis-1,2-dichloroethene was detected in 8 of 14 groundwater samples. However, the detection limit for those samples that did not detect cis-1,2-DCE was higher than those that did detect it. This tended to bias the statistical analysis for this constituent, resulting in an inflated 95% UCL concentration. The maximum detected level of cis-1,2-dichloroethene was 0.6 µg/ℓ, well below the MCL of 6 µg/ℓ.

2.6.1.1.2.3 Air

The Sacramento Metropolitan Air Quality Management District (SMAQMD) chemical-specific limits for emissions of reactive organic chemicals (ROC) is the relevant and appropriate chemical-specific requirement for air. Most organic gases are classified as ROCs; however, the definition of ROC specifically excludes methane, most inorganic carbon gases, and halogenated hydrocarbons. Under Regulation 2, Rule 202, Paragraph 301.1 of the SMAQMD sets the maximum allowable emission of ROC as 0 pounds per day. Tables 2.1 through 2.6 summarize the analytical results for the integrated surface air sampling for each Landfill OU site. Benzene was the only ROC detected in the air and it

was found in levels between 0.33 and 1.5 ppbv. Because these are trace levels, it is not believed that the landfills exceed the ARAR.

Table 2.14 Site 2 - Designated Level Methodology

Constituent	Water Quality Goal	Environmental Attenuation Factor	Soluble Designated Level	Total Designated Level	Concentration (95% UCL)	WET Results (95% UCL)	Chemical of Concern?
SUBSURFACE SOILS							
Cadmium (1)	0.005	100	0.05	50	2.51	0.0171	No (A)
Cobalt (2)	50	100	500	500000	29.68	0.579	No (A)(B)
Copper (3)	1	1000	100	100000	66.3	1.287	No (A)(B)
Nickel (1)*	0.1	100	1	1000	69.87	0.499	No (A)
Zinc (3)	5	1000	500	500000	104.99	1.55	No (A)(B)

NOTES:

All units in ppm

* = Proposed at time Focused Feasibility Study was conducted, value was finalized and effective in January 1994

Water Quality Goal Sources:

- (1) U.S. Primary Drinking Water Standards (40 Code of Federal Regulations Part 141) or California Primary Drinking Water Standards (22 California Code of Regulations 64473)
- (2) No promulgated standards identified for cobalt. Value obtained from "Water Quality for Agriculture", Food and Agriculture Organization of the United Nations - Irrigation and Drainage Paper No. 29, Rev. 1 [Rome 1985] and may be considered as a To-Be-Considered.
- (3) U.S. Environmental Protection Agency Secondary Drinking Water Standards (40 Code of Federal Regulations Part 143); proposed value from Central Valley Regional Water Quality Control Board [CVRWQCB 1993].

Reasons for removal from list of Chemicals of Potential Concern:

- (A) Waste Extraction Tests Results < Soluble Designated Level
- (B) Concentration of Constituent < 10 x Soluble Designated Level

UCL = upper confidence level

WET = waste extraction test

Table 2.15 Site 3 - Designated Level Methodology

Constituent	Water Quality Goal	Environmental Attenuation Factor	Soluble Designated Level	Total Designated Level	Concentration (95% UCL)	WET Results (95% UCL)	Chemical of Concern?
SURFACE SOILS							
Acenaphthylene (1)	0.0000028	100	0.000028	0.0028	0.27	NR	Yes
4,4-DDE (2)	0.001	100	0.01	1	0.018	NR	No (A)
4,4-DDT (2)	0.001	100	0.01	1	0.044	NR	No (A)
Toluene (3)*	0.04	100	0.4	40	0.013	NR	No (A)
Total Xylenes (3)*	0.02	100	0.2	20	0.0033	NR	No (A)
Arsenic (2)	0.005	100	0.05	50	11.3	ND	No (B)
Barium (5)	1	100	10	10000	1386	8.025	No (B)
Chromium (5)	0.05	100	0.5	500	127.54	0.143	No (B)
Chromium VI (5)	0.05	100	0.5	500	1.97	NR	No (B)(C)
Copper (3)	1	1000	100	100000	63.76	0.763	No (B)(C)
Lead (2)	0.00025	100	0.0025	2.5	500.35	1.795	Yes**
Manganese (3)	0.05	100	0.5	500	1036.76	58.8	Yes**
Nickel (4)	0.1	100	1	1000	45.23	0.34	No (B)
Zinc (3)	5	1000	500	500000	410.28	2.533	No (B)(C)
SUBSURFACE SOILS							
Methylene chloride (4)*	0.005	100	0.05	5	0.03	NR	No (A)
Aluminum (5)	1	100	100	100000	65107.54	NR	No (A)
Chromium VI (5)	0.05	100	0.5	500	0.35	0.0109	No (B)(C)
Copper (3)	1	1000	100	100000	61.05	1.726	No (B)(C)
Molybdenum (1)	0.05	100	0.5	500	2.79	NR	No (A)
Nickel (4)	0.1	100	1	1000	50.18	0.458	No (B)
Silver (5)	0.05	100	0.5	500	1.39	ND	No (B)(C)
Zinc (3)	5	1000	500	500000	97.09	1.408	No (B)(C)

NOTES:

All units in ppm

NR = Not recorded

DDT = dichlorodiphenyltrichloroethane

UCL = upper confidence level

Water Quality Goal Sources:

(1) Risk Based

(2) Proposition 65

(3) U.S. Environmental Protection Agency Secondary Drinking Water Standards (40 Code of Federal Regulations Part 143)

(4) U.S. Environmental Protection Agency Primary Drinking Water Standards (40 Code of Federal Regulations Part 141)

(5) California Primary Maximum Contaminant Level

Reasons for removal from list of Chemicals of Potential Concern:

(A) Total Designated Level > Constituent Concentrations

(B) Waste Extraction Test Results < Soluble Designated Level

(C) Concentration of Constituent < 10 x Soluble Designated Level

* Proposed value from Central Valley Regional Water Quality Control Board [CVRWQCB 1993]

** Determination based on limited background data. Additional data may eliminate contaminant from list of chemicals of potential concern.

Table 2.16 Site 4 - Designated Level Methodology

Constituent	Water Quality Goal	Environmental Attenuation Factor	Soluble Designated Level	Total Designated Level	Concentration (95% UCL)	WET Results (95% UCL)	Chemical of Concern?
SURFACE SOILS							
2-Butanone (1)	0.2	100	2	200	0.01	NR	No (A)
Toluene (2)*	0.04	100	0.4	40	0.00539	NR	No (A)
Barium (4)	1	100	10	10000	248.69	10.003	No (B)
Chromium VI (4)	0.05	100	0.5	500	1.95	0.0113	No (B)(C)
Copper (2)	1	1000	100	100000	91.61	1.435	No (B)(C)
Manganese (2)	0.05	100	0.5	500	1110.21	42.38	Yes**
Nickel (3)	0.1	100	1	1000	60.05	0.445	No (B)
Zinc (2)	5	1000	500	500000	88.47	2.499	No (B)(C)
SUBSURFACE SOILS							
Barium (4)	1	100	10	10000	279.12	10	No (B)
Chromium VI (4)	0.05	100	0.5	500	0.42	0.0113	No (B)(C)
Cobalt (5)	50	100	500	500000	32.45	0.58	No (B)(C)
Copper (2)	1	1000	100	100000	69.96	1.435	No (B)(C)
Manganese (2)	0.05	100	0.5	500	1217.14	42.38	Yes**
Molybdenum (1)	0.05	100	0.5	500	3.33	0.0312	No (B)(C)
Nickel (3)	0.1	100	1	1000	61.46	0.445	No (B)
Silver (4)	0.05	100	0.5	500	4.08	0.0068	No (B)(C)
Zinc (2)	5	1000	500	500000	131.02	2.499	No (B)(C)
SEDIMENTS							
2-Butanone (1)	0.2	100	2	200	0.01054	NR	No (A)
Ethylbenzene (2)	0.03	100	0.3	30	0.0028	NR	No (A)
Toluene (2)*	0.04	100	0.4	40	0.00582	NR	No (A)
Chromium VI (4)	0.05	100	0.5	500	1.25	0.0113	No (B)(C)

Table 2.16 Site 4 - Designated Level Methodology (continued)

Constituent	Water Quality Goal	Environmental Attenuation Factor	Soluble Designated Level	Total Designated Level	Concentration (95% UCL)	WET Results (95% UCL)	Chemical of Concern?
SEDIMENTS (continued)							
Copper (2)	1	1000	100	100000	77.2	1.435	No (B)(C)
Mercury (3)	0.002	100	0.02	20	0.19	ND	No (B)(C)
Nickel (3)	0.1	100	1	1000	50.28	0.455	No (B)
Silver (3)	0.05	100	0.5	500	2.07	0.0068	No (B)(C)
Zinc (2)	5	1000	500	500000	116.91	2.499	No (B)(C)

NOTES:

NR = not recorded

UCL = upper confidence level

All units in ppm

ND = not detected

WET = waste extraction test

Water Quality Goal Sources:

(1) U.S. Environmental Protection Agency Health Advisory

(2) U.S. Environmental Protection Agency Secondary Drinking Water Standards (40 Code of Federal Regulations Part 143)

(3) U.S. Environmental Protection Agency Primary Drinking Water Standards (40 Code of Federal Regulations Part 141)

(4) California Primary Maximum Contaminant Level

(5) No promulgated standards identified for cobalt. Value obtained from "Water Quality for Agriculture", Food and Agriculture Organization of the United Nations - Irrigation and Drainage Paper No. 29, Rev. 1 [Rome 1985] and may be considered as a To-Be-Considered.

Reasons for removal from list of Chemicals of Potential Concern:

(A) Total Designated Level > Total Constituent Concentration

(B) Waste Extraction Test Results < Soluble Designated Level

(C) Concentration of Constituent < 10 x Soluble Designated Level

* Proposed value reference is Central Valley Regional Water Quality Control Board [CVRWQCB 1993]

** Determination based on limited background data. Additional data may eliminate contaminant from list of chemicals of potential concern.

Table 2.17 Site 5 - Designated Level Methodology

Constituent	Water Quality Goal	Environmental Attenuation Factor	Soluble Designated Level	Total Designated Level	Concentration (95% UCL)	WET Results (95% UCL)	Chemical of Concern?
SURFACE SOILS							
Toluene (1)*	0.04	100	0.4	40	0.00543	NR	No (A)
Barium (4)	1	100	10	10000	11207.13	11.604	Yes**
Chromium VI (4)	0.05	100	0.5	500	1.05	0.0239	No (B)(C)
Cobalt (3)	50	100	500	500000	103.49	0.936	No (B)(C)
Copper (1)	1	1000	100	100000	162.78	1.335	No (B)(C)
Manganese (1)	0.05	100	0.5	500	2487.9	85.5	Yes**
Nickel (2)	0.1	100	1	1000	2035.56	0.393	No (B)
Vanadium (5)	0.02	100	0.2	200	664.75	0.958	Yes**
Zinc (1)	5	1000	500	500000	130.35	4.208	No (B)(C)
SUBSURFACE SOILS							
Barium (4)	1	100	10	10000	281.94	11.604	Yes**
Cadmium (2)	0.005	100	0.05	50	1.38	0.0106	No (B)
Cobalt (3)	50	100	500	500000	31.13	0.936	No (B)(C)
Copper (1)	1	1000	100	100000	61.9	1.335	No (B)(C)
Manganese (1)	0.05	100	0.5	500	1429.7	85.5	Yes**
Mercury (2)	0.002	100	0.02	20	0.05	ND	No (B)(C)
Nickel (2)	0.1	100	1	1000	48.76	0.393	No (B)
Silver (4)	0.05	100	0.5	500	3.24	0.0131	No (B)(C)
Zinc (1)	5	1000	500	500000	116.3	4.208	No (B)(C)
SEDIMENTS							
Toluene (1)*	0.04	100	0.4	40	0.004	NR	No (A)
Chromium VI (4)	0.05	100	0.5	500	0.82	0.0239	No (B)(C)
Copper (1)	1	1000	100	100000	111	1.335	No (B)(C)

Table 2.17 Site 5 - Designated Level Methodology (continued)

Constituent	Water Quality Goal	Environmental Attenuation Factor	Soluble Designated Level	Total Designated Level	Concentration (95% UCL)	WET Results (95% UCL)	Chemical of Concern?
SEDIMENTS (continued)							
Nickel (2)	0.1	100	1	1000	46.9	0.393	No (B)
Silver (4)	0.05	100	0.5	500	3	0.0131	No (B)(C)
Zinc (1)	5	1000	500	500000	181	4.208	No (B)(C)

NOTES:

All units in ppm
 ND = not detected
 NR = not recorded
 WET = waste extraction test
 UCL = upper confidence level

Water Quality Goal Sources:

- (1) U.S. Environmental Protection Agency Secondary Drinking Water Standards (40 Code of Federal Register Part 143)
- (2) U.S. Environmental Protection Agency Primary Drinking Water Standards (40 Code of Federal Register Part 141)
- (3) No promulgated standards identified for cobalt. Value obtained from "Water Quality for Agriculture", Food and Agriculture Organization of the United Nations - Irrigation and Drainage Paper No. 29, Rev. 1 [Rome 1985] and may be considered as a To-Be-Considered.
- (4) California Primary Maximum Contaminant Level
- (5) U.S. Environmental Protection Agency Health Advisory

Reasons for removal from list of Chemicals of Potential Concern:

- (A) Total Designated Level > Total Constituent Concentration
- (B) Waste Extraction Test Results < Soluble Designated Level
- (C) Concentration of Constituent < 10 x Soluble Designated Level

* Proposed values from Central Valley Regional Water Quality Control Board [CVRWQCB 1993]

** Determination based on limited background data. Additional data may eliminate contaminant from list of chemicals of potential concern.

Table 2.18 Site 6 - Designated Level Methodology

Constituent	Water Quality Goal	Environmental Attenuation Factor	Soluble Designated Level	Total Designated Level	Concentration (95% UCL)	WET Results (95% UCL)	Chemical of Concern?
Surface Soils							
Barium (2)	1	100	10	10000	304.15	8.521	No (A)
Cadmium (1)	0.005	100	0.05	50	3.51	0.0533	No (A)
Chromium VI (2)	0.05	100	0.5	500	3.25	0.2399	No (A)(B)
Copper (3)	1	1000	100	100000	85.71	0.951	No (A)(B)
Lead (4)	0.00025	100	0.0025	2.5	82.17	1.091	Yes*
Nickel (1)	0.1	100	1	1000	41.47	0.2402	No (A)
Zinc (3)	5	1000	500	500000	102.64	2.581	No (A)(B)
Subsurface Soils							
Methylene chloride (1)*	0.005	100	0.05	5	0.03		No (B)(C)
Antimony (7)	0.003	100	0.03	30	8.56	0.0852	Yes*
Barium (2)	1	100	10	10000	222.53	9.353	No (A)
Cadmium (1)	0.005	100	0.05	50	2.99	0.0116	No (A)(B)
Cobalt (5)	50	100	500	500000	39.26	0.408	No (A)(B)
Copper (3)	1	1000	100	100000	82.56	0.936	No (A)(B)
Silver (2)	0.05	100	0.5	500	5.14	0.0101	No (A)
Zinc (3)	5	1000	500	500000	148.61	1.969	No (A)(B)
Sediments							
Barium (2)	1	100	10	10000	526.5	9.353	No (A)
Chromium VI (2)	0.05	100	0.5	500	1.19	0.0167	No (A)(B)
Cobalt (5)	50	100	500	500000	29.25	0.408	No (A)(B)
Copper (3)	1	10000	100	100000	229.39	0.936	No (A)(B)
Lead (4)	0.00025	100	0.0025	2.5	50.29	0.053	Yes*
Manganese (3)	0.05	100	0.5	500	1367.65	27.205	Yes*
Molybdenum (6)	0.05	100	0.5	500	4.7	0.0334	No (A)(B)
Nickel (1)	0.1	100	1	1000	75.73	0.325	No (A)
Zinc (3)	5	1000	500	500000	313.93	1.969	No (A)(B)

NOTES:

WET = waste extraction test UCL = upper confidence level

All units in ppm

Water Quality Goal Sources:

(1) U.S. Environmental Protection Agency Primary Drinking Water Standards (40 Code of Federal Register Part 141)

(2) California Primary Maximum Contaminant Level

(3) U.S. Environmental Protection Agency Secondary Drinking Water Standards (40 Code of Federal Register Part 143)

(4) Proposition 65

(5) No promulgated standards identified for cobalt. Value obtained from "Water Quality for Agriculture", Food and Agriculture Organization of the United Nations - Irrigation and Drainage Paper No. 29, Rev. 1 [Rome 1985] and may be considered as a To-Be-Considered.

(6) U.S. Environmental Protection Agency Health Advisory

(7) Maximum Contaminant Level Goals (proposed)

Reasons for removal from list of Chemicals of Potential Concern:

(A) Waste Extraction Test Results < Soluble Designated Level

(B) Concentration of Constituent < 10 times Soluble Designated Level

(C) Total Designated Level > Total Constituent Concentration

* Determination based on limited background data. Additional data may eliminate contaminant from list of chemicals of potential concern.

Table 2.19 Surface Water ARARs

Site	Constituent	Concentration Range (ppb)	Federal Standards (ppb)		Chemical of Potential Concern
			Primary MCL	Ambient Water Quality Criteria	
4	Barium	47.6 - 76.1	2000	1000	No
	Lead (Total)	2(ND) - 3.6	50 ^c	--	No
	Manganese	55 - 97	50 ^a	50 ^b	Yes*
	Zinc	12.7 - 50	5000 ^a	5000 ^b	No
5	Barium	69.5	2000	1000	No
	Lead (Total)	4.3	50 ^c	--	No
	Manganese	33	50 ^a	50 ^b	No
	Zinc	11.1	5000 ^a	5000 ^b	No
6	Barium	130.79	2000	1000	No
	Lead	7.81	50 ^c	--	No
	Manganese	262.57	50 ^a	50 ^b	Yes*
	Zinc	18.79	5000 ^a	5000 ^b	No

^a - Secondary MCL

^b - Taste & Odor or Welfare criteria

^c - Federal MCL was 50 ppb at the time of the FFS was prepared; since that time the MCL has been lowered to 15 ppb. The change in the MCL has not resulted in lead being identified as a chemical of potential concern.

* - Determination based on limited background data. Additional data may eliminate contaminant from list of chemicals of potential concern

ND - Not detected

ppb - parts per billion

ARAR - Applicable or Relevant and Appropriate Requirements

MCL - Maximum Contaminant Levels

FFS - Focused Feasibility Study

Table 2.20 Groundwater Constituents Above ARARs

Site	Constituent	Frequency of Detection	95% UCL Concentration	Water Quality Goal (ppb)
3 - Groundwater Unit B	cis-1,2-dichloroethene	8/14	6.96 ¹ (max. detection = 0.6)	6
	Tetrachloroethylene	18/20	5.09	5
	Manganese	3/3	417.88	50
	Nickel	1/3	894.09	100
4 - Groundwater Unit B	Manganese	2/5	117.39	50
6 - Groundwater Unit C	Manganese	6/6	81.38	50

ARAR = Applicable or Relevant and Appropriate Requirements
 95% UCL = 95% Upper Confidence Level
 ppb = parts per billion

¹ The detection limit of the non-detected samples was higher than the detected sample levels. This tended to bias the statistical analysis for this constituent, resulting in an inflated 95% UCL concentration.

The other constituents associated with the Landfill OU groundwaters were manganese and nickel. These constituents may be within background. However, groundwater background data for these constituents are currently unavailable. Other metal concentrations were below MCLs.

2.6.1.1.2.4 Process/Disposal Knowledge

No constituents were removed from the list of COPCs based solely on process/disposal knowledge.

2.6.1.1.2.5 Risk Assessment Results

This step in the screening process assured that each constituent which posed a carcinogenic risk greater than 1×10^{-6} or a hazard quotient (HQ) greater than 1.0 would be retained as a COPC.

Tables 2.21 through 2.25 present the justification for including or excluding each constituent from the final COPC list based on the above-described screening factors.

The final list of COPCs for the Landfill OU sites, resulting from application of the screening processes, is presented in Table 2.26.

Table 2.21 Site 2 - Chemicals of Potential Concern

Media	Constituent	COPC	Justification
Air	Benzene	Yes	Cancer risk due to inhalation $> 1 \times 10^{-6}$
Subsurface soils	Cadmium Cobalt Copper Nickel Zinc	No	DLM, no impact to groundwater, HQ < 1, likely within background concentration, lack of process knowledge for release of constituent

DLM = Designated Level Methodology
 HQ = Hazard Quotient, noncarcinogenic risk
 COPC = Chemicals of Potential Concern

Table 2.22 Site 3 - Chemicals of Potential Concern

Media	Constituent	COPC	Justification
Air	Benzene Methylene chloride Tetrachloroethylene Vinyl chloride	Yes Yes**	Risk due to inhalation $> 1 \times 10^{-6}$
	1,1,1-Trichloroethane	No	Not found in soil samples, risk $< 1 \times 10^{-6}$
Surface soil	Acenaphthylene	No	High affinity to bond to soil, only 1 detection in 4 samples, Class D carcinogen, low risk, no impact to groundwater
	4,4-DDE 4,4-DDT	No	DLM, risk $< 1 \times 10^{-6}$, concentration in soils below water quality goal (impacts impossible)
	Toluene Total Xylenes	No	DLM, very low concentration, concentration in soils below water quality goal (impacts impossible), risk $< 1 \times 10^{-6}$
	Arsenic	Yes	Risk due to ingestion of surface soils $> 1 \times 10^{-6}$
	Barium Chromium Chromium VI Copper Zinc	No	DLM, no impact to groundwater, HQ < 1 , likely within background concentration, lack of process knowledge for release of constituent
	Lead	Yes	HQ > 1 for surface soil ingestion
	Manganese	Yes*	HQ < 1 , lack of process knowledge for release of constituent, concentration is probably within background because constituent concentration exceeds background by less than 3% (also by only a fraction of the standard deviation), available background data are limited, essential nutrient, water quality goal is Secondary Drinking Water Standard for taste and odor, not a sufficient driver for remedial action
	Nickel	No	DLM, detected in 1 groundwater sample in Site 3 ($> \text{MCL}$), however, not found in groundwater in Sites 4 or 5, HQ < 1
Subsurface soils	Methylene chloride	No	DLM, very low concentration, concentration in soils below drinking water MCL, risk $< 1 \times 10^{-6}$
	Aluminum	No	DLM, EPA considers aluminum an essential nutrient, lack of process knowledge for release of constituent, concentration is probably within background, no reference dose or slope factor available, only water quality standard is California MCL, no federal MCL or health based advisories
	Chromium VI Copper Nickel Silver Zinc	No	DLM, no impact to groundwater, HQ < 1 , likely within background concentration, lack of process knowledge for release of constituent

COPC = Chemicals of Potential Concern

DDE = dichlorodiphenyldichloroethylene

DDT = dichlorodiphenyltrichloroethane

DLM = Designated Level Methodology

HQ = Hazard Quotient, noncarcinogenic risk

EPA = U.S. Environmental Protection Agency

MCL = Maximum Contaminant Levels

Yes* = Determination based on limited background data. Additional data may eliminate contaminant from list of COPCs

Yes** = Vinyl chloride was detected in landfill gas characterization well vapor samples but not in the integrated surface air samples. Vinyl chloride will be likely entrained in the vented gas.

Table 2.23 Site 4 - Chemicals of Potential Concern

Media	Constituent	COPC	Justification
Air	Benzene	Yes	Risk due to inhalation $> 1 \times 10^{-6}$
	Methylene chloride	No	1 detection/6 analyses, common laboratory chemical, risk $< 1 \times 10^{-6}$
	1,1,1-Trichloroethane	No	Not found in soil samples, 1 detection/6 analyses, HQ < 1
Surface soil	2-Butanone	No	DLM, concentration in soil less than groundwater MCL, HQ < 1
	Toluene	No	DLM, concentration in soil less than groundwater MCL, common laboratory contaminant, HQ < 1
	Barium Chromium VI Copper Nickel Zinc	No	DLM, no impact to groundwater, HQ < 1 , likely within background concentration, lack of process knowledge for release of constituent
	Manganese	Yes*	HQ < 1 , Lack of process knowledge for release of constituent, concentration is probably within background, available background data are limited, essential nutrient, water quality goal is Secondary Drinking Water Standard for taste and odor, not a sufficient driver for remedial action
Subsurface soils	Barium Chromium VI Copper Molybdenum Nickel Silver Zinc	No	DLM, no impact to groundwater, HQ < 1 , likely within background concentration, lack of process knowledge for release of constituent
	Cobalt	No	DLM, no impact to groundwater, no water quality ARAR or health advisory available, likely within background concentration, lack of process knowledge for release of constituent
	Manganese	Yes*	HQ < 1 , Lack of process knowledge for release of constituent, concentration is probably within background, available background data are limited, essential nutrient, water quality goal is Secondary Drinking Water Standard for taste and odor, not a sufficient driver for remedial action
Sediments	2-Butanone Ethylbenzene Toluene	No	DLM, concentration in soil less than groundwater MCL, HQ < 1
	Chromium VI Copper Mercury Nickel Silver Zinc	No	DLM, no impact to groundwater, HQ < 1 , likely within background concentration, lack of process knowledge for release of constituent
Surface Water	Manganese	Yes*	HQ < 1 , Lack of process knowledge for release of constituent, concentration is probably within background, available background data are limited, essential nutrient, water quality goal is Secondary Drinking Water Standard for taste and odor, not a sufficient driver for remedial action

DLM = Designated Level Methodology
 HQ = Hazard Quotient, noncarcinogenic risk
 MCL = Maximum Contaminant Levels
 ARAR = Applicable or Relevant and Appropriate Requirements
 COPC = Chemicals of Potential Concern
 Yes* = Determination based on limited background data. Additional data may eliminate contaminant from list of COPCs

Table 2.24 Site 5 - Chemicals of Potential Concern

Media	Constituent	COPC	Justification
Air	Benzene	Yes	Risk due to inhalation $> 1 \times 10^{-6}$
	Methylene chloride	No	Not found in soil samples, Risk $< 1 \times 10^{-6}$
Surface soil	Toluene	No	DLM, concentration in soil less than groundwater MCL, common laboratory contaminant, HQ < 1
	Barium	Yes	WET results only slightly elevated over soluble designated level, no impact to groundwater, HQ < 1 , likely within background concentration, lack of process knowledge for release of constituent
	Chromium VI Cobalt Copper Nickel Zinc	No	DLM, no impact to groundwater, HQ < 1 , likely within background concentration, lack of process knowledge for release of constituent
	Manganese	No	HQ < 1 , Lack of process knowledge for release of constituent, only 2 samples analyzed, highest concentration within background, essential nutrient, water quality goal is Secondary Drinking Water Standard for taste and odor, not a sufficient driver for remedial action
Subsurface soils			
	Chromium VI Cobalt Copper Molybdenum Nickel Silver Zinc	No	DLM, no impact to groundwater, HQ < 1 , likely within background concentration, lack of process knowledge for release of constituent
	Manganese	Yes*	HQ < 1 , Lack of process knowledge for release of constituent, likely within background concentration, lack of process knowledge for release of constituent, essential nutrient, water quality goal is Secondary Drinking Water Standard for taste and odor, not a sufficient driver for remedial action
Sediments			
	Chromium VI Copper Nickel Silver Zinc	No	DLM, no impact to groundwater, HQ < 1 , likely within background concentration, lack of process knowledge for release of constituent

DLM = Designated Level Methodology

COPC = Chemicals of Potential Concern

HQ = Hazard Quotient, noncarcinogenic risk

MCL = Maximum Contaminant Levels

WET = Waste Extraction Test

Yes* = Determination based on limited background data. Additional data may eliminate contaminant from list of COPCs

Table 2.25 Site 6 - Chemicals of Potential Concern

Media	Constituent	COPC	Justification
Air	Benzene Methylene chloride Tetrachloroethylene Vinyl Chloride	Yes Yes**	Risk due to inhalation $> 1 \times 10^{-6}$
	1,1,1-Trichloroethane	No	Not found in soil samples, risk $< 1 \times 10^{-6}$
Surface soil	Barium Cadmium Chromium VI Copper Nickel Zinc	No	DLM, no impact to groundwater, HQ < 1 , likely within background concentration, lack of process knowledge for release of constituent
	Lead	Yes	HQ > 1 , potential risk to juveniles through soil ingestion
Subsurface soils	Methylene chloride	No	DLM, no impact to groundwater, common laboratory contaminant, detected 3 times in 49 samples, ILCR $< 1 \times 10^{-6}$, HQ < 1
	Antimony	Yes*	HQ < 1 , Lack of process knowledge for release of constituent, concentration is probably within background, available background data are limited
	Barium Cadmium Copper Silver Zinc	No	DLM, no impact to groundwater, HQ < 1 , likely within background concentration, lack of process knowledge for release of constituent
	Cobalt	No	DLM, no impact to groundwater, likely within background concentration, lack of process knowledge for release of constituent
Sediments	Barium Chromium VI Copper Lead Molybdenum Nickel Zinc	No	DLM, no impact to groundwater, HQ < 1 , likely within background concentration, lack of process knowledge for release of constituent
	Cobalt	No	DLM, no impact to groundwater, likely within background concentration, lack of process knowledge for release of constituent
	Manganese	No	HQ < 1 , Lack of process knowledge for release of constituent, detected 3/3 samples, highest concentration within background, essential nutrient, water quality goal is Secondary Drinking Water Standard for taste and odor, not a sufficient driver for remedial action
Surface Water	Manganese	Yes*	HQ < 1 , Lack of process knowledge for release of constituent, concentration is probably within background, available background data are limited, essential nutrient, water quality goal is Secondary Drinking Water Standard for taste and odor, not a sufficient driver for remedial action

DLM = Designated Level Methodology

COPC = Chemicals of Potential Concern

HQ = Hazard Quotient, noncarcinogenic risk

ILCR = Incremental Lifetime Cancer Risks

Yes* = Determination based on limited background data. Additional data may eliminate contaminant from list of COPCs

Yes** = Vinyl chloride was detected in gas characterization well vapor samples but not in the integrated surface air samples. Vinyl chloride will likely be entrained in the vented gas.

Table 2.26 Final Landfill OU FFS Chemicals of Potential Concern

Media	Site				
	2	3	4	5	6
Air	Benzene ^a	Benzene ^a Methylene chloride ^a Tetrachloroethylene ^a Vinyl chloride ^{**}	Benzene ^a	Benzene ^a	Benzene ^a Methylene chloride ^a Tetrachloroethylene ^a Vinyl Chloride ^{**}
Surface Soil	none	Arsenic ^a Lead ^b Manganese ^c	Manganese ^c	Barium ^c	Lead ^{b,*}
Subsurface Soil	none	none	Manganese ^c	Barium ^c Manganese ^c	Antimony ^c
Sediments	none	none	none	none	Lead ^c
Surface Water	none	none	Manganese ^c	none	Manganese ^c

FFS = Focused Feasibility Study

OU = operable unit

^a ILCR > 1×10^{-6} and < 1×10^{-4} per baseline risk assessment [IT 1993c]

^b Hazard quotient > 1.0 per baseline risk assessment [IT 1993c]

^c Determination based on limited background information. Additional data may eliminate from list of COPCs.

^{**} Vinyl chloride was detected in gas characterization well vapor samples but not in the integrated surface air samples. Vinyl chloride will likely be entrained in the vented gas.

2.6.1.2 Exposure Assessment

Although there are no residents currently in base housing, the area was used to house base workers and their families until September 30, 1993, and is planned to be used again after redevelopment. The RI baseline risk assessment included an exposure assessment for Sites 2, 3, 4, 5, and 6, for residential, trespasser, and occupational receptors [IT 1993c]. Trespassers are the principal potential current receptors now that Mather AFB is closed. Table 2.27 presents the current potential exposure scenarios and COPCs at Sites 2, 3, 4, 5, and 6. The baseline risk assessment included exposure assessments for future potential residential and occupational receptors [IT 1993c]. Table 2.28 presents the future potential exposure scenarios and COPCs at Sites 2, 3, 4, 5, and 6. The COPCs were established during the FFS [IT 1993e] and are presented in Table 2.26.

2.6.1.3 Toxicity Assessment

To understand the potential health risks associated with the chemicals of potential concern at the Mather AFB Landfill OU sites, information on chemical-specific chronic toxicity is required. This toxicity information is used in conjunction with results of the exposure assessment to characterize the potential health risks at Mather AFB Sites 2, 3,

4, 5, and 6, and is summarized from the Group 2 Sites RI baseline risk assessment [IT 1993c].

Table 2.27 Current Potential Exposure Scenarios and Chemicals of Potential Concern

Potentially Exposed Population	Exposure Pathway	Chemicals of Potential Concern
Site 2		
Base Workers	Inhalation of landfill gas emissions	Benzene
Site 3		
Base Residents/Trespassers	Inhalation landfill gas emissions	Benzene, Methylene chloride, Tetrachloroethylene, Vinyl chloride*
Base Residents/Trespassers	Incidental ingestion of surface soil	Arsenic, Lead, Manganese
Site 4		
Base Residents/Trespassers	Inhalation of landfill gas emissions	Benzene
Base Residents/Trespassers	Incidental ingestion of surface soil	Manganese
Base Residents/Trespassers	Incidental ingestion of surface water	Manganese
Site 5		
Base Residents/Trespassers	Inhalation of landfill gas emissions	Benzene
Base Residents/Trespassers	Incidental ingestion of surface soil	Barium
Site 6		
Base Residents/Trespassers	Inhalation of landfill gas emissions	Benzene, Methylene chloride, Tetrachloroethylene, Vinyl Chloride*
Base Residents/Trespassers	Incidental ingestion of surface soil	Manganese
Base Residents/Trespassers	Incidental ingestion of surface water	Manganese

Source IT 1993c and IT 1993e

* Vinyl chloride was detected in gas characterization well vapor samples but not in the integrated surface air samples. Vinyl chloride will likely be entrained in the vented gas.

Table 2.28 Future Potential Exposure Scenarios and Chemicals of Potential Concern

Potentially Exposed Population	Exposure Pathway	Chemicals of Potential Concern
Site 2		
Workers	Inhalation of landfill gas emissions	Benzene
Site 3		
Residents/Workers	Inhalation landfill gas emissions	Benzene, Methylene chloride, Tetrachloroethylene, Vinyl chloride*
Residents/Workers	Incidental ingestion of surface soil	Arsenic, Lead, Manganese
Site 4		
Residents/Workers	Inhalation of landfill gas emissions	Benzene
Residents/Workers	Incidental ingestion of surface soil	Manganese
Residents/Workers	Incidental ingestion of surface water	Manganese
Workers	Incidental ingestion of subsurface soil	Manganese
Site 5		
Residents/Workers	Inhalation of landfill gas emissions	Benzene
Residents/Workers	Incidental ingestion of surface soil	Barium
Workers	Incidental ingestion of subsurface soil	Barium, Manganese
Site 6		
Residents	Inhalation of landfill gas emissions	Benzene, Methylene chloride, Tetrachloroethylene, Vinyl Chloride*
Residents/Workers	Incidental ingestion of surface soil	Lead
Residents/Workers	Incidental ingestion of sediments	Lead
Residents/Workers	Incidental ingestion of surface water	Manganese
Workers	Incidental ingestion of subsurface soil	Manganese

Source IT 1993c and IT 1993e

* Vinyl chloride was detected in gas characterization well vapor samples but not in the integrated surface air samples. Vinyl chloride will likely be entrained in the vented gas.

The U.S. EPA evaluates available chemical-specific toxicity information and presents this data in the *Integrated Risk Information System (IRIS)* data base [EPA 1992] and the *Health Effects Assessment Summary Tables (HEAST)* [EPA 1991]. The IRIS and HEAST toxicity information includes chemical-specific cancer slope factor (CSF) and reference dose (RfD) values. A CSF describes the dose-response relationship of a cancer causing chemical, i.e., a carcinogen. A RfD, which is also called a threshold dose, describes the dose above which adverse health effects other than cancer may result. The CSF and RfD values are often derived from animal studies. Two fundamental uncertainties

associated with the use of laboratory animal studies for calculation the CSF and RfD values are:

- The extrapolation of toxic effects observed at high doses necessary to conduct animal studies to effects that might occur at much lower, environmentally relevant doses.
- The extrapolation from toxic effects in animals to toxic effects in humans (i.e., responses of animals may be different from responses of humans).

The U.S. EPA has devised CSFs using weight-of-evidence approach to studies in the scientific literature. The CSFs represent the 95 percent UCL on the slope of the dose response curve for carcinogenic responses. Because the CSFs represent the upper limits of the slope of the line, the use of CSF is more likely to overestimate the actual risk than underestimate it.

The RfD values have associated uncertainty factors. In addition to the two overriding uncertainties noted above, there are additional uncertainties because animal studies often are used to establish the lowest-observable-adverse-effect-level (LOAEL). The LOAEL is then used to calculate the no-observed-adverse-effect-level (NOAEL). Either the LOAEL or NOAEL is used in calculation of the RfD. The uncertainty factor is used to account for five types of uncertainty that are applicable to noncarcinogenic toxicological values:

- sensitive subpopulations in the general population;
- extrapolation from animals to humans;
- extrapolation from a subchronic study to a chronic estimate;
- extrapolation from a LOAEL to a NOAEL, and;
- additional uncertainties in the critical study used to set the RfD.

The RfD is the total acceptable daily intake of a chemical. The RfD does not assume that the receptor is exposed to the chemical from other unidentified sources.

Table 2.29 summarizes the toxicity information for the carcinogenic COPC for Sites 2, 3, 4, 5, and 6. Table 2.30 summarizes the toxicity information for the noncarcinogenic COPC for Sites 2, 3, 4, 5, and 6. For many chemicals the route of exposure is a significant factor in the toxicity, and as a result CSF and RfD values are provided for the different routes of exposure, i.e., oral (ingestion), inhalation, and dermal routes.

However, none of the COPC at Sites 2, 3, 4, 5, and 6 have any known toxic effects that are different for oral versus dermal exposure, so only oral and inhalation data are presented in Tables 2.29 and 2.30.

The U.S. EPA has not established an oral RfD for lead, because its toxicity is not thought to demonstrate a threshold. An estimated RfD was calculated in the Group 2 Sites RI baseline risk assessment [IT 1993c] using the approach of Marcus [Marcus 1986]. The estimated oral RfD is 0.0005 mg/kg/day for adults and 0.0007 mg/kg/day for children [IT 1993c]. In the baseline risk assessment [IT 1993c] a RfD of 0.0007 mg/kg/day was adopted for both children and adult oral lead exposure.

2.6.1.4 Risk Characterization

Excess lifetime cancer risks are calculated using the assumed contaminant intake level, other exposure correction factors, and the CSF. The excess lifetime cancer risk for a probable human carcinogen was obtained by multiplying the intake for the contaminant by the contaminant's CSF. These risks are probabilities that are generally expressed in scientific notation (e.g., 1×10^{-6}). An excess lifetime cancer risk of 1×10^{-6} indicates that, as a plausible upper bound, an individual has a one in one million chance of developing cancer as a result of site-related exposure to a carcinogen over a 70-year lifetime under specific exposure conditions at a site.

Potential concern for noncarcinogenic effects of a single contaminant in a single medium is expressed as the HQ (or the ratio of the estimated intake derived from the contaminant concentration in a given medium to the contaminant's reference dose). By adding the HQs for all contaminants within a medium or across all media to which a given population may reasonably be exposed, the Hazard Index (HI) can be generated. The HI provides a useful reference point for gauging the potential significance of

**Table 2.29 Toxicity Summary for Chemicals of Potential Concern Mather AFB Sites 2, 3, 4, 5, and 6:
Carcinogenic Effects**

Chemical of Potential Concern	Oral CSF (mg/kg/day) ⁻¹	Carcinogen Class	Target Organ or Type of Cancer	Species	Inhalation CSF (mg/kg/day) ⁻¹	Carcinogen Class	Target Organ or Type of Cancer	Species
Arsenic	1.75	A	Skin	Human	50	A	Respiratory Tract	Human
Benzene	0.029	A	Leukemia	Human	0.029	A	Leukemia	Human
Methylene chloride	0.0075	B2	Liver	Mouse	0.0016	B2	Lung, Liver	Mouse
Tetrachloroethene	0.051	B2	Liver	Mouse	0.0018	B2	Leukemia, Liver	Rat, Mouse

AFB - Air Force Base

CSF - Cancer Slope Factor

Carcinogen Class A - Known human carcinogen

Carcinogen Class B2 - Probable human carcinogen, no human data

mg/kg/day - milligram per kilogram per day

Source - IT 1993c

**Table 2.30 Toxicity Summary for Chemicals of Potential Concern Mather AFB Sites 2, 3, 4, 5, and 6:
Noncarcinogenic Effects**

Chemical of Potential Concern	Oral RfD (mg/kg/day)	Critical Effect	Species	Uncertainty Factor	Inhalation RfD (mg/kg/day)	Critical Effect	Species	Uncertainty Factor
Antimony	0.0004	Reduced lifespan, altered blood chemistry	Rat	1000	ND	NA	NA	NA
Arsenic	0.001	Keratosis and hyperpigmentation	Human	1	ND	NA	NA	NA
Barium	0.05	Increased blood pressure	Rat	100	0.0004	Fetotoxicity	Rat	1000
Lead	0.0007	Central nervous system	Human	NA	0.0007	Central nervous system	Human	NA
Manganese	0.1	No effect	Human	1	0.0004	Respiratory symptoms, psychomotor disturbances	Human	900
Tetrachloroethene	0.01	Hepatotoxicity	Mouse	1000	ND	NA	NA	NA

RfD - Reference Dose

ND - not determined

NA - not available or not applicable

mg/kg/day - milligram per kilogram per day

Source - IT 1993c

multiple contaminant exposures within a single medium or across media. The HI provides a numerical indicator of the nearness to acceptable limits of exposure or the degree to which acceptable exposure levels are exceeded. As the HI increases toward unity (i.e., 1.0), so does concern for the potential hazard posed by the constituent.

For the Group 2 Sites baseline risk assessment, a residential unrestricted land use, maximum exposure scenario was assumed. The potential risk posed by exposure to contaminants was estimated by quantifying potential human intake and identifying toxicity characteristics for the COPCs in the exposure pathways. The baseline risk assessment considered risk from groundwater. However, because groundwater is not addressed in this ROD, the groundwater risk values were not included in this document.

The results of the risk characterization process for the Landfill OU sites are summarized in Tables 2.31 through 2.40.

Table 2.31 Estimated Daily Intakes and Incremental Lifetime Cancer Risks for Carcinogens - Site 2

Potentially Exposed Populations	Exposure Pathway	Constituent	Estimated Intake (mg/kg/day)	ILCR
Current Land Use				
Base Workers	Inhalation of landfill gas emissions	Benzene	7.3×10^{-5}	2.1×10^{-6}
Future Land Use				
Workers	Inhalation of landfill gas emissions	Benzene	4.4×10^{-5}	1.3×10^{-6}

ILCR = Incremental Lifetime Cancer Risk
 mg/kg/day = milligram per kilogram per day

**Table 2.32 Estimated Daily Intakes and Hazard Quotients
for Noncarcinogens - Site 2**

Potentially Exposed Populations	Exposure Pathway	Constituent	Estimated Intake (mg/kg/day)	Hazard Quotient
Future Land Use				
Residents	Ingestion of Drinking Water (Unit C)	1,2-Dichlorobenzene	2.7×10^{-6}	3.0×10^{-5}
		Methylene chloride	2.2×10^{-5}	3.7×10^{-4}
		1,1,1-Trichloroethane	8.0×10^{-6}	8.8×10^{-5}
		Arsenic	8.9×10^{-5}	8.9×10^{-2}
		Barium	4.1×10^{-4}	8.2×10^{-3}
		Lead	1.7×10^{-4}	3.5×10^{-1}
		Manganese	5.5×10^{-4}	5.5×10^{-3}
		Vanadium	4.0×10^{-4}	5.7×10^{-2}
		Xylene (Total)	1.4×10^{-6}	6.9×10^{-7}
		Zinc	4.1×10^{-4}	2.0×10^{-3}
		Total		5.2×10^{-1}

mg/kg/day - milligram per kilogram per day

**Table 2.33 Estimated Daily Intakes and Incremental Lifetime Cancer Risks
for Carcinogens - Site 3**

Potentially Exposed Populations	Exposure Pathway	Constituent	Estimated Intake (mg/kg/day)	ILCR
Current Land Use				
Base Residents/ Trespassers	Inhalation of landfill gas emissions	Benzene	2.9×10^{-4}	8.6×10^{-6}
		Methylene chloride	8.9×10^{-3}	1.5×10^{-5}
		Tetrachloroethene	1.5×10^{-3}	2.7×10^{-6}
		Total		2.6×10^{-5}
Base Residents/ Trespassers	Incidental ingestion of surface soil	4,4'-DDE	3.3×10^{-10}	1.1×10^{-10}
		4,4'-DDT	8.0×10^{-10}	2.7×10^{-10}
		Arsenic	3.9×10^{-7}	6.8×10^{-7}
		Total		6.8×10^{-7}
Base Residents/ Trespassers	Dermal contact with surface soil	4,4'-DDE	2.7×10^{-10}	9.3×10^{-11}
		4,4'-DDT	6.7×10^{-10}	2.3×10^{-10}
		Total		3.2×10^{-10}
Future Land Use				
Workers	Incidental ingestion of subsurface soil	Methylene chloride	1.5×10^{-8}	1.1×10^{-10}
Workers	Dermal contact with subsurface soil	Methylene chloride	1.1×10^{-9}	8.5×10^{-12}
Residents	Dermal contact with surface soil	4,4'-DDE	2.7×10^{-10}	9.3×10^{-11}
		4,4'-DDT	6.7×10^{-10}	2.3×10^{-10}
		Total		3.2×10^{-10}
Residents (Adult and Juvenile)	Incidental ingestion of surface soil	4,4'-DDE	4.2×10^{-9}	1.4×10^{-9}
		4,4'-DDT	1.0×10^{-8}	3.5×10^{-9}
		Arsenic	5.0×10^{-6}	8.8×10^{-6}
		Total		8.8×10^{-6}
Workers	Inhalation of landfill gas emissions	Benzene	1.1×10^{-4}	3.1×10^{-6}
		Methylene chloride	3.2×10^{-3}	5.3×10^{-6}
		Tetrachloroethene	5.4×10^{-4}	9.8×10^{-7}
		Total		9.3×10^{-6}

ILCR = Incremental Lifetime Cancer Risk
 mg/kg/day = milligram per kilogram per day
 DDE = dichlorodiphenyldichloroethylene
 DDT = dichlorodiphenyltrichloroethane

**Table 2.34 Estimated Daily Intakes and Hazard Quotients
for Noncarcinogens - Site 3**

Potentially Exposed Populations	Exposure Pathway	Constituent	Estimated Intake (mg/kg/day)	Hazard Quotient
Current Land Use				
Base Residents/ Trespassers	Incidental ingestion of surface soil	4,4-DDT	2.2×10^{-9}	4.5×10^{-6}
		Toluene	6.1×10^{-10}	3.0×10^{-9}
		Xylenes (Total)	5.1×10^{-11}	2.5×10^{-11}
		Arsenic	1.1×10^{-6}	1.1×10^{-3}
		Barium	1.4×10^{-4}	2.7×10^{-3}
		Chromium	1.2×10^{-5}	1.2×10^{-5}
		Chromium VI	1.8×10^{-7}	3.7×10^{-5}
		Copper	5.2×10^{-6}	1.4×10^{-4}
		Lead	4.9×10^{-5}	7.1×10^{-2}
		Manganese	1.0×10^{-4}	1.0×10^{-3}
		Nickel	4.0×10^{-6}	2.0×10^{-4}
		Zinc	4.0×10^{-5}	2.0×10^{-4}
		Total		7.6×10^{-2}
Base Residents/ Trespassers	Dermal contact with surface soil	4,4-DDT	1.9×10^{-9}	3.7×10^{-6}
		Toluene	5.1×10^{-10}	2.5×10^{-9}
		Xylenes (Total)	4.2×10^{-11}	2.1×10^{-11}
		Total		3.7×10^{-6}
Base Residents/ Trespassers	Inhalation of landfill gas emissions	Methylene chloride	2.1×10^{-2}	2.4×10^{-2}
		Tetrachloroethene	3.5×10^{-3}	3.5×10^{-1}
		1,1,1-Trichloroethane	1.1×10^{-2}	3.8×10^{-2}
		Total		4.1×10^{-1}
Future Land Use				
Residents (Adult)	Incidental ingestion of surface soil	4,4-DDT	3.0×10^{-8}	6.0×10^{-5}
		Arsenic	1.5×10^{-5}	1.5×10^{-2}
		Barium	1.8×10^{-3}	3.6×10^{-2}
		Chromium	1.7×10^{-4}	1.7×10^{-4}
		Chromium VI	2.5×10^{-6}	4.9×10^{-4}
		Copper	7.0×10^{-5}	1.9×10^{-3}
		Lead	6.6×10^{-4}	9.5×10^{-1}
		Manganese	1.3×10^{-3}	1.3×10^{-2}
		Nickel	5.4×10^{-5}	2.7×10^{-3}
		Toluene	8.2×10^{-9}	4.1×10^{-8}
		Xylenes (Total)	6.8×10^{-10}	3.4×10^{-10}
		Zinc	5.4×10^{-4}	2.7×10^{-3}
		Total		1.0×10^0

**Table 2.34 Estimated Daily Intakes and Hazard Quotients
for Noncarcinogens - Site 3 (continued)**

Potentially Exposed Populations	Exposure Pathway	Constituent	Estimated Intake (mg/kg/day)	Hazard Quotient
Residents (Juvenile)	Incidental ingestion of surface soil	4,4-DDT	5.3×10^{-7}	1.1×10^{-3}
		Arsenic	1.3×10^{-4}	1.3×10^{-1}
		Barium	1.6×10^{-2}	3.2×10^{-1}
		Chromium	1.5×10^{-3}	1.5×10^{-3}
		Chromium VI	2.2×10^{-5}	4.3×10^{-3}
		Copper	6.2×10^{-4}	1.7×10^{-2}
		Lead	5.7×10^{-3}	8.3×10^0
		Manganese	1.2×10^{-2}	1.2×10^{-1}
		Nickel	4.8×10^{-4}	2.4×10^{-2}
		Toluene	1.4×10^{-7}	7.2×10^{-7}
		Xylenes (Total)	1.2×10^{-8}	6.0×10^{-9}
		Zinc	4.7×10^{-3}	2.4×10^{-2}
		Total		9.0×10^0
Residents	Dermal contact with surface soil	4,4-DDT	1.6×10^{-9}	3.1×10^{-6}
		Toluene	4.3×10^{-10}	2.1×10^{-9}
		Xylenes (Total)	3.6×10^{-11}	1.8×10^{-11}
		Total		3.1×10^{-6}
Workers	Incidental ingestion of subsurface soil	Chromium VI	1.6×10^{-6}	3.3×10^{-4}
		Copper	2.9×10^{-4}	7.7×10^{-3}
		Molybdenum	1.3×10^{-5}	3.3×10^{-3}
		Methylene chloride	7.1×10^{-8}	1.2×10^{-6}
		Nickel	2.4×10^{-4}	1.2×10^{-2}
		Silver	6.5×10^{-6}	2.2×10^{-3}
		Zinc	4.6×10^{-4}	2.3×10^{-3}
		Total		2.8×10^{-2}
Workers	Dermal contact with subsurface soil	Methylene chloride	5.3×10^{-9}	8.9×10^{-8}
Workers	Inhalation of landfill gas emissions	Methylene chloride	1.5×10^{-2}	1.7×10^{-2}
		Tetrachloroethene	2.5×10^{-3}	2.5×10^{-1}
		1,1,1-Trichloroethane	8.1×10^{-3}	2.7×10^{-2}
		Total		3.0×10^{-1}

mg/kg/day - milligram per kilogram per day
DDT - dichlorodiphenyltrichloroethane

**Table 2.35 Estimated Daily Intakes and Incremental Lifetime Cancer Risks
for Carcinogens - Site 4**

Potentially Exposed Populations	Exposure Pathway	Constituent	Estimated Intake (mg/kg/day)	ILCR
Current Land Use				
Base Residents/ Trespasser	Inhalation of landfill gas emissions	Benzene	1.0×10^{-5}	3.0×10^{-7}
		Methylene chloride	1.4×10^{-5}	2.3×10^{-8}
		Total		3.2×10^{-7}
Future Land Use				
Workers	Inhalation of landfill gas emissions	Benzene	1.8×10^{-4}	5.2×10^{-6}
		Methylene chloride	2.4×10^{-4}	3.9×10^{-7}
		Total		5.6×10^{-6}

ILCR = Incremental Lifetime Cancer Risk
mg/kg/day = milligram per kilogram per day

**Table 2.36 Estimated Daily Intakes and Hazard Quotients
for Noncarcinogens - Site 4**

Potentially Exposed Populations	Exposure Pathway	Constituent	Estimated Intake (mg/kg/day)	Hazard Quotient
Current Land Use				
Base Residents/ Trespasser	Incidental ingestion of surface soil	2-Butanone	5.1×10^{-10}	1.0×10^{-8}
		Toluene	2.5×10^{-10}	1.3×10^{-9}
		Barium	2.2×10^{-5}	4.5×10^{-4}
		Chromium VI	1.8×10^{-7}	3.7×10^{-5}
		Copper	8.7×10^{-6}	2.4×10^{-4}
		Manganese	1.1×10^{-4}	1.1×10^{-3}
		Nickel	5.8×10^{-6}	2.9×10^{-4}
		Zinc	8.5×10^{-6}	4.2×10^{-5}
		Total		2.1×10^{-3}
Base Residents/ Trespasser	Dermal contact with surface soil	2-Butanone	4.2×10^{-10}	8.5×10^{-9}
		Toluene	2.1×10^{-10}	1.1×10^{-9}
		Total		9.6×10^{-9}
Base Residents/ Trespasser	Inhalation of landfill gas emissions	Methylene chloride	3.9×10^{-5}	4.6×10^{-5}
		1,1,1-Trichloroethane	2.4×10^{-5}	7.9×10^{-5}
		Total		1.2×10^{-4}
Future Land Use				
Residents (Adult)	Incidental ingestion of surface soil	2-Butanone	6.9×10^{-9}	1.4×10^{-7}
		Toluene	3.4×10^{-9}	1.7×10^{-8}
		Barium	3.0×10^{-4}	6.0×10^{-3}
		Chromium VI	2.5×10^{-6}	4.9×10^{-4}
		Copper	1.2×10^{-4}	3.2×10^{-3}
		Manganese	1.5×10^{-3}	1.5×10^{-2}
		Nickel	7.8×10^{-5}	3.9×10^{-3}
		Zinc	1.1×10^{-4}	5.7×10^{-4}
		Total		2.9×10^{-2}
Residents (Juvenile)	Incidental ingestion of surface soil	2-Butanone	6.0×10^{-8}	1.2×10^{-6}
		Toluene	3.0×10^{-8}	1.5×10^{-7}
		Barium	1.3×10^{-3}	2.6×10^{-2}
		Chromium VI	1.1×10^{-5}	2.2×10^{-3}
		Copper	5.1×10^{-4}	1.4×10^{-2}
		Manganese	6.4×10^{-3}	6.4×10^{-2}
		Nickel	3.4×10^{-4}	1.7×10^{-2}
		Zinc	5.0×10^{-4}	2.5×10^{-3}
		Total		1.3×10^{-1}
Residents	Dermal contact with surface soil	2-Butanone	3.5×10^{-10}	7.1×10^{-9}
		Toluene	1.8×10^{-10}	8.9×10^{-10}
		Total		8.0×10^{-9}

**Table 2.36 Estimated Daily Intakes and Hazard Quotients
for Noncarcinogens - Site 4 (continued)**

Potentially Exposed Populations	Exposure Pathway	Constituent	Estimated Intake (mg/kg/day)	Hazard Quotient
Workers	Incidental ingestion of subsurface soil	Barium	1.3×10^{-3}	2.6×10^{-2}
		Chromium VI	2.0×10^{-6}	4.0×10^{-4}
		Copper	3.3×10^{-4}	8.9×10^{-3}
		Manganese	5.7×10^{-3}	5.7×10^{-2}
		Molybdenum	1.6×10^{-5}	3.9×10^{-3}
		Nickel	2.9×10^{-4}	1.4×10^{-2}
		Silver	1.9×10^{-5}	6.4×10^{-3}
		Zinc	6.2×10^{-4}	3.1×10^{-3}
		Total		1.2×10^{-1}
Workers	Inhalation of landfill gas emissions	Methylene chloride	1.1×10^{-3}	1.3×10^{-3}
		1,1,1-Trichloroethane	6.9×10^{-4}	2.3×10^{-3}
		Total		3.6×10^{-3}

mg/kg/day - milligram per kilogram per day

**Table 2.37 Estimated Daily Intakes and Incremental Lifetime Cancer Risks
for Carcinogens - Site 5**

Potentially Exposed Populations	Exposure Pathway	Constituent	Estimated Intake (mg/kg/-day)	ILCR
Current Land Use				
Base Residents/ Trespassers	Inhalation of landfill gas emissions	Benzene	3.4×10^{-6}	9.8×10^{-8}
		Methylene chloride	8.5×10^{-6}	1.4×10^{-8}
		Total		1.1×10^{-7}
Future Land Use				
Workers	Inhalation of landfill gas emissions	Benzene	5.9×10^{-5}	1.7×10^{-6}
		Methylene chloride	1.5×10^{-4}	2.3×10^{-7}
		Total		1.9×10^{-6}

ILCR = Incremental Lifetime Cancer Risk
mg/kg/day = milligram per kilogram per day

**Table 2.38 Estimated Daily Intakes and Hazard Quotients
for Noncarcinogens - Site 5**

Potentially Exposed Populations	Exposure Pathway	Constituent	Estimated Intake (mg/kg/day)	Hazard Quotient
Current Land Use				
Base Residents/ Trespassers	Incidental ingestion of surface soil	Toluene	1.0×10^{-10}	5.1×10^{-10}
		Barium	1.8×10^{-4}	3.5×10^{-3}
		Chromium VI	7.7×10^{-8}	1.5×10^{-5}
		Copper	7.6×10^{-6}	2.0×10^{-4}
		Manganese	7.5×10^{-5}	7.4×10^{-4}
		Nickel	3.4×10^{-5}	1.7×10^{-3}
		Vanadium	1.7×10^{-5}	2.5×10^{-3}
		Zinc	8.6×10^{-6}	4.3×10^{-5}
		Total		8.6×10^{-3}
Base Residents/ Trespassers	Dermal contact with surface soil	Toluene	8.5×10^{-11}	4.2×10^{-10}
Base Residents/ Trespassers	Inhalation of landfill gas emissions	Methylene chloride	2.4×10^{-5}	2.7×10^{-5}
Future Land Use				
Residents (Adult)	Incidental ingestion of surface soil	Toluene	1.4×10^{-9}	6.8×10^{-9}
		Barium	2.4×10^{-3}	4.7×10^{-2}
		Chromium VI	1.0×10^{-6}	2.1×10^{-4}
		Copper	1.0×10^{-4}	2.7×10^{-3}
		Manganese	1.0×10^{-3}	1.0×10^{-2}
		Nickel	4.5×10^{-4}	2.3×10^{-2}
		Vanadium	2.3×10^{-4}	3.3×10^{-2}
		Zinc	1.2×10^{-4}	5.8×10^{-4}
		Total		1.2×10^{-1}
Residents (Juvenile)	Incidental ingestion of surface soil	Toluene	1.2×10^{-8}	6.0×10^{-8}
		Barium	2.1×10^{-2}	4.1×10^{-1}
		Chromium VI	9.1×10^{-6}	1.8×10^{-3}
		Copper	8.9×10^{-4}	2.4×10^{-2}
		Manganese	8.8×10^{-3}	8.8×10^{-2}
		Nickel	4.0×10^{-3}	2.0×10^{-1}
		Vanadium	2.0×10^{-3}	2.9×10^{-1}
		Zinc	1.0×10^{-3}	5.1×10^{-3}
		Total		1.0×10^0
Residents	Dermal contact with surface soil	Toluene	7.1×10^{-11}	3.5×10^{-10}
Workers	Inhalation of landfill gas emissions	Methylene chloride	6.8×10^{-4}	8.0×10^{-4}

**Table 2.38 Estimated Daily Intakes and Hazard Quotients
for Noncarcinogens - Site 5 (continued)**

Potentially Exposed Populations	Exposure Pathway	Constituent	Estimated Intake (mg/kg/day)	Hazard Quotient
Workers	Incidental ingestion of subsurface soil	Barium	1.3×10^{-3}	2.6×10^{-2}
		Cadmium	6.5×10^{-6}	6.5×10^{-3}
		Copper	2.9×10^{-4}	7.9×10^{-3}
		Manganese	6.7×10^{-3}	6.7×10^{-2}
		Mercury	2.4×10^{-7}	7.8×10^{-4}
		Nickel	2.3×10^{-4}	1.1×10^{-2}
		Silver	1.5×10^{-5}	5.1×10^{-3}
		Zinc	5.5×10^{-4}	2.7×10^{-3}
		Total		1.3×10^{-1}

mg/kg/day - milligram per kilogram per day

**Table 2.39 Estimated Daily Intakes and Incremental Lifetime
Cancer Risks for Carcinogens - Site 6**

Potentially Exposed Populations	Exposure Pathway	Constituent	Estimated Intake (mg/kg/day)	ILCR
Current Land Use				
Base Residents/Trespassers	Inhalation of landfill gas emissions	Benzene	9.9×10^{-6}	2.9×10^{-7}
		Methylene chloride	2.2×10^{-4}	3.7×10^{-7}
		Tetrachloroethene	2.3×10^{-5}	4.3×10^{-8}
		Total		7.0×10^{-7}
Future Land Use				
Residents	Inhalation of landfill gas emissions	Benzene	4.8×10^{-4}	1.4×10^{-5}
		Methylene chloride	1.1×10^{-2}	1.8×10^{-5}
		Tetrachloroethene	1.1×10^{-3}	2.1×10^{-6}
		Total		3.4×10^{-5}
Workers	Incidental ingestion of subsurface soil	Methylene chloride	8.1×10^{-11}	6.0×10^{-13}
Workers	Dermal contact with subsurface soil	Methylene chloride	6.1×10^{-12}	4.5×10^{-14}

ILCR = Incremental Lifetime Cancer Risk
mg/kg/day = milligram per kilogram per day

**Table 2.40 Estimated Daily Intakes and Hazard Quotients
for Noncarcinogens - Site 6**

Potentially Exposed Populations	Exposure Pathway	Constituent	Estimated Intake (mg/kg/day)	Hazard Quotient
Current Land Use				
Base Residents/ Trespassers	Incidental ingestion of surface soil	Cadmium	6.7×10^{-7}	6.7×10^{-4}
		Barium	5.9×10^{-5}	1.2×10^{-3}
		Chromium VI	6.1×10^{-7}	1.2×10^{-4}
		Copper	1.6×10^{-5}	4.4×10^{-4}
		Lead	1.4×10^{-5}	2.0×10^{-2}
		Nickel	8.1×10^{-6}	4.1×10^{-4}
		Zinc	1.9×10^{-5}	9.6×10^{-5}
		Total		2.3×10^{-2}
Base Residents/ Trespassers	Inhalation of landfill gas emissions	Methylene chloride	6.3×10^{-4}	7.3×10^{-4}
		1,1,1-Trichloroethane	2.3×10^{-4}	7.7×10^{-4}
		Tetrachloroethene	6.6×10^{-5}	6.6×10^{-3}
		Total		8.0×10^{-3}
Future Land Use				
Residents (Adult)	Incidental ingestion of surface soil	Barium	4.0×10^{-4}	8.0×10^{-3}
		Cadmium	4.5×10^{-6}	4.5×10^{-3}
		Chromium VI	4.1×10^{-6}	8.2×10^{-4}
		Copper	1.1×10^{-4}	2.9×10^{-3}
		Lead	9.1×10^{-5}	1.3×10^{-1}
		Nickel	5.5×10^{-5}	2.7×10^{-3}
		Zinc	1.3×10^{-4}	6.5×10^{-4}
		Total		1.5×10^{-1}
Residents (Juvenile)	Incidental ingestion of surface soil	Barium	3.5×10^{-3}	7.0×10^{-2}
		Cadmium	4.0×10^{-5}	4.0×10^{-2}
		Chromium VI	3.6×10^{-5}	7.2×10^{-3}
		Copper	9.5×10^{-4}	2.6×10^{-2}
		Lead	8.0×10^{-4}	1.2×10^0
		Nickel	4.8×10^{-4}	2.4×10^{-2}
		Zinc	1.1×10^{-3}	5.7×10^{-3}
		Total		1.3×10^0
Residents	Inhalation of landfill gas emissions	Methylene chloride	2.6×10^{-2}	3.0×10^{-2}
		1,1,1-Trichloroethane	9.3×10^{-3}	3.1×10^{-2}
		Tetrachloroethene	2.7×10^{-3}	2.7×10^{-1}
		Total		3.3×10^{-1}

**Table 2.40 Estimated Daily Intakes and Hazard Quotients
for Noncarcinogens - Site 6 (continued)**

Potentially Exposed Populations	Exposure Pathway	Constituent	Estimated Intake (mg/kg/day)	Hazard Quotient
Workers	Incidental ingestion of subsurface soil	Methylene chloride	7.4×10^{-8}	1.2×10^{-6}
		Antimony	4.2×10^{-5}	1.0×10^{-1}
		Barium	1.1×10^{-3}	2.2×10^{-2}
		Cadmium	1.5×10^{-5}	1.5×10^{-2}
		Copper	4.0×10^{-4}	1.1×10^{-2}
		Silver	2.5×10^{-5}	8.4×10^{-3}
		Zinc	7.3×10^{-4}	3.6×10^{-3}
		Total		1.6×10^{-1}
Workers	Dermal contact with subsurface soil	Methylene chloride	5.5×10^{-9}	9.2×10^{-8}

mg/kg/day - milligram per kilogram per day

2.6.2 Environmental Risks

There are few environmental risks associated with contaminants at Sites 2, 3, 4, 5, and 6 as reported in the RI/Feasibility Study Site Inspection Report [IT 1990a], the Group 2 Sites RI Report [IT 1993c], and Landfill OU FFS Report [IT 1993e] because there are no:

- critical habitats affected by contamination at Sites 2, 3, 4, 5, or 6;
- endangered species or habitats of endangered species affected by contamination at Sites 2, 3, 4, 5, or 6; and
- indications that vernal pools located near Sites 3 and 4 are currently under stress [IT 1993c].

Some environmental risk may be associated with future remedial actions taken at Sites 3, 4, and 6. The remedial actions taken at Sites 3 and 6 must protect and prevent degradation of the nearby vernal pools. Remedial actions taken at Site 4 must protect and prevent degradation of the nearby vernal pools as well as fish and wildlife habitat associated with the nearby floodplain.

However, actual or threatened releases of the COPCs in the landfills, surface soil, subsurface soil, sediment, water, and landfill gas emissions, if not addressed by implementing the response action selected in this ROD, may present potential threat to public health, welfare, or the environment.

These conclusions are based on Section 8.4 "FLORA and FAUNA" of the Site Inspection Report [IT 1990a] and Section 6.3.1.2 "Receptor Assessment" of the Group 2 Sites RI Report [IT 1993c]. Site-specific ecological risk assessments have not been performed; however, a basewide comprehensive risk assessment, which will include an ecological risk assessment, will be completed before issuance of the final Mather AFB ROD.

2.7 Description of Alternatives

A total of 16 remedial alternatives for the six Landfill OU sites were developed for detailed analysis in the FFS Report for the Landfill OU sites [IT 1993e]. Soils and air are the affected media at the Landfill OU sites that were addressed in the FFS. Any groundwater contamination, which may be present beneath the landfill sites, will be addressed as part of the Groundwater and Soil OU FFS. Because no unacceptable risk

exists from the landfills in their current state, cleanup alternatives were developed which focused on:

- eliminating contact with the landfill contents; and
- complying with regulations governing the closure of landfills.

Table 2.41 summarizes the alternatives considered for the landfill sites. A brief summary of the remedial alternatives follows below.

2.7.1 Site 1 Remedial Alternative

One alternative was developed for application at Site 1.

2.7.1.1 Alternative 1.1

Alternative 1.1 is the "no-action" alternative as required by the NCP [40 CFR Part 300]. The no-action alternative serves as a baseline for evaluating remedial action measures and is defined as the current site conditions. It was the only alternative developed for Site 1 because the contents of this landfill were removed prior to construction of the runway overrun.

2.7.2 Site 2 Remedial Alternatives

Three alternatives were developed for possible application at Site 2.

2.7.2.1 Alternative 2.1 - No-Action

Alternative 2.1 is the "no-action" alternative and is defined as the current site conditions with semi-annual groundwater monitoring for 5 years under the existing Base groundwater monitoring program. At the end of the 5-year period, an evaluation would be performed to determine if continued groundwater monitoring would be necessary.

2.7.2.2 Alternative 2.2 - Landfill Capping

Under this alternative, a vegetative cover would be installed over the landfill. However, if groundwater impairment is identified through additional groundwater sampling an engineered cap will be installed over the landfill. Passive gas vent wells would be installed to prevent pressure buildup of gases beneath the cover surface and to abate potential lateral migration of gases.

Table 2.41 Mather AFB Remedial Alternatives

Technology	Site 1	Site 2			Site 3			Site 4			Site 5			Site 6		
	Alt 1.1	Alt 2.1	Alt 2.2	Alt 2.3	Alt 3.1	Alt 3.2	Alt 3.3	Alt 4.1	Alt 4.2	Alt 4.3	Alt 5.1	Alt 5.2	Alt 5.3	Alt 6.1	Alt 6.2	Alt 6.3
No Action	•	•			•			•			•			•		
Access Restrictions			•			•			•	•			•		•	
Landfill Monitoring		•	•	•	•	•	•	•	•	•	•	•	•	•	•	•
Capping			•			•			•	•			•		•	
Gas Venting ¹			•			•			•	•			•		•	
Excavation				•			•			•		•	•			•
Embankments									•				•			
Compaction ²																
Disposal/Consolidation				•			•			•		•	•			•
Thermal Treatment ³																

Alt = Alternative

- ¹⁾ Best Available Control Technology for offgas is applicable to gas venting technology if there is an increase in daily reactive organic chemical emissions.
- ²⁾ Compaction was not evaluated as a remedial alternative for the purpose of specifically reducing soil and refuse volumes. However, moderate compaction would be achieved from heavy equipment operation during excavation/consolidation or cap/cover construction.
- ³⁾ Thermal treatment of solid waste was judged as very costly and difficult to implement. Thermal treatment of the off-gas was determined as unnecessary based on modeling projections.

Alternative 2.2 assumed gas monitoring would occur quarterly for five years, then semi-annually through year 30; in practice, gas monitoring will be conducted quarterly until a frequency adjustment is proposed and approved by the ROD signatories. Alternative 2.2 assumed groundwater monitoring would occur semi-annually for five years, then annually through year 30; in practice, groundwater monitoring will be conducted quarterly until frequency adjustment is proposed and approved by representatives of the ROD signatory agencies. A review of monitoring frequency will be conducted no less than every five years.

Access restrictions would involve fencing and deed restrictions to maintain the integrity of the vegetative cover. Deed restrictions would be imposed to prevent excavations and certain types of land use, such as farming, that would be considered inappropriate.

2.7.2.3 *Alternative 2.3 - Landfill Excavation and Consolidation*

Under this alternative, landfill refuse and associated soils would be excavated, transported to, and placed at the consolidation site (i.e., Site 4) with commercially available equipment. Prior to excavation, the site would undergo a preliminary design investigation (PDI) to define the vertical extent of soils affected by landfill leachate. Once excavation had been started, it would continue until post-excavation "verification" samples indicated that underlying soils were clean. The site would then be recontoured to eliminate topographic depressions and it would then be clean-closed.

Alternative 2.3 assumed groundwater monitoring would occur quarterly for three years; in practice, groundwater monitoring will be conducted quarterly until a frequency adjustment is proposed and approved by representatives of the ROD signatory agencies.

2.7.3 *Site 3 Remedial Alternatives*

Three alternatives were developed for possible application at Site 3.

2.7.3.1 *Alternative 3.1 - No-Action*

This is the "no-action" alternative and is defined as the current site conditions with semi-annual groundwater monitoring for five years under the existing Base groundwater monitoring program. At the end of the five-year period, an evaluation would be performed to determine if continued monitoring would be necessary.

2.7.3.2 *Alternative 3.2 - Landfill Capping*

Under this alternative, an engineered cap would be installed over the landfill. Passive gas vent wells would be installed to prevent pressure buildup of gases beneath the cap surface and to abate potential lateral migration of gases.

Alternative 3.2 assumed gas monitoring would occur quarterly for five years, then semi-annually through year 30; in practice, gas monitoring would occur quarterly for five years, then semi-annually through year 30; in practice, groundwater monitoring will be conducted quarterly until a frequency adjustment is proposed and approved by representatives of the ROD signatory agencies. A review of monitoring frequency will be conducted no less than every five years.

Access restrictions would involve fencing and deed restrictions to preserve the integrity of the engineered cap. Deed restrictions would be imposed to prevent excavations and certain types of land use, such as farming, that are deemed inappropriate.

2.7.3.3 *Alternative 3.3 - Landfill Excavation and Consolidation*

Under this alternative, landfill refuse and associated soils would be excavated, transported to, and placed at the consolidation site (i.e., Site 4) with commercially available equipment. Prior to excavation, the site would undergo a PDI to define the vertical extent of soils affected by landfill leachate. Once excavation had been started, it would continue until post-excavation "verification" samples indicated that underlying soils were clean. The site would then be recontoured to eliminate topographic depressions and clean-closed.

Alternative 3.3 assumed groundwater monitoring would occur quarterly for three years, then semi-annually through year 10; in practice, groundwater monitoring will be conducted quarterly until a frequency adjustment is proposed and approved by representatives of ROD signatory agencies. A review of monitoring frequency will be conducted no less than every five years.

2.7.4 *Site 4 Remedial Alternatives*

Three alternatives were developed for possible application at Site 4.

2.7.4.1 *Alternative 4.1 - No-Action*

This is the "no-action" alternative and is defined as the current site conditions with semi-annual groundwater monitoring for 5 years under the existing Base groundwater monitoring program. At the end of the 5-year period, an evaluation would be performed to determine if continued monitoring would be necessary.

2.7.4.2 *Alternative 4.2 - Landfill Capping and Embankment*

Under this alternative, an engineered cap would be installed over the landfill. In order to protect the southeastern portion of the cap from an intermittent stream and its floodwaters, flood control measures, such as an embankment, would be installed. Passive gas vent wells would be installed to prevent pressure buildup of gases beneath the cap surface and to abate potential lateral migration of gases. The foundation layer may consist of soil, contaminated soil, or other waste material of suitable engineering properties, compacted to a maximum density.

Alternative 4.2 assumed gas monitoring would occur quarterly for five years, then semi-annually through year 30; in practice, gas monitoring will be conducted quarterly until a frequency adjustment is proposed by the ROD signatories. Alternative 4.2 assumed groundwater monitoring will be conducted quarterly for five years, then semi-annually through year 30; in practice, groundwater monitoring would be conducted quarterly until a frequency adjustment is proposed and approved by representatives of the ROD signatory agencies. A review of monitoring frequencies would be conducted no less than every five years.

Access restrictions would involve fencing and deed restrictions to preserve the integrity of the engineered cap. Deed restrictions would be imposed to prevent excavations and certain types of land use, such as farming, that are deemed inappropriate.

2.7.4.3 *Alternative 4.3 - Landfill Excavation, Consolidation, and Capping*

The eastern portion of the landfill, the portion that is bordered by a drainage area, would be excavated and combined with the remaining refuse and associated soils. The excavated area would be recontoured to eliminate topographic depressions. Removing the eastern portion of the landfill would eliminate the need for flood control and would reduce the area of the landfill. An engineered cap would then be installed over the reduced landfill area. The foundation layer may consist of soil, contaminated soil, or other waste material of suitable engineering properties, compacted to maximum density.

Passive gas vent wells would be installed to prevent pressure buildup of gases beneath the cap surface and to abate potential lateral migration of gases. Prior to excavation, the site would undergo a PDI to define the vertical extent of soils affected by landfill leachate. Once excavation had been started, it would continue until post-excavation "verification" samples indicated that underlying soils were clean. The site would then be recontoured to eliminate topographic depressions and it would then be clean-closed.

Alternative 4.3 assumed gas monitoring would occur quarterly for five years, then semi-annually through year 30; in practice, gas monitoring will be conducted quarterly until a frequency adjustment is proposed and approved by the ROD signatories. Alternative 4.3 assumed groundwater monitoring would occur quarterly for five years, then semi-annually through year 30; in practice, groundwater monitoring will be conducted quarterly until a frequency adjustment is proposed and approved by representatives of the ROD signatory agencies. A review of monitoring frequency will be conducted no less than every five years.

Access restrictions would involve fencing and deed restrictions to preserve the integrity of the engineered cap. Deed restrictions would be imposed to prevent excavations and certain types of land use, such as farming, that are deemed inappropriate.

2.7.5 Site 5 Remedial Alternatives

Three alternatives were developed for possible application at Site 5.

2.7.5.1 Alternative 5.1 - No-Action

This alternative is the "no-action" alternative and is defined as the current site conditions with semi-annual groundwater monitoring for 5 years under the existing Base groundwater monitoring program. At the end of the 5-year period, an evaluation would be performed to determine if continued monitoring would be necessary.

2.7.5.2 Alternative 5.2 - Landfill Excavation and Consolidation

Under this alternative, landfill refuse and associated soils would be excavated, transported to, and placed at the consolidation site (i.e., Site 4) with commercially available equipment. Prior to excavation, the site would undergo a PDI to define the vertical extent of soils affected by landfill leachate. No contaminated soil will be left in place with concentrations

of constituents that threaten water quality unless it is technically or economically infeasible to remove this soil. Technical or economic feasibility will be determined by the Air Force, in consultation with U.S. EPA and the State, based on the factors described in Porter Collogne § 13304 and 23 CCR § 2550.4, and subject to the signatory parties' authority in the Federal Facility Agreement and CERCLA §121. A Water Quality Assessment will be conducted using the Designated Level Methodology and V-LEACH, depending on the constituent, or other equivalent appropriate method to determine whether a threat to groundwater quality remains. If a threat to groundwater quality remains, it will be addressed by consideration of alternative remedial actions. The site would then be recontoured to eliminate topographic depressions and clean-closed.

The discharge to Site 4 of hazardous waste, designated waste, containerized liquids (intact liquid containers of five-gallons or greater), solid waste containing free liquid or moisture in excess of the waste's moisture holding capacity, and liquid or semi-solid waste (i.e., waste containing less than 50% solids), is prohibited. During consolidation of refuse from Sites 5 and 6 into 4, intact containers of 5-gallons or larger and any significant quantities of apparently prohibited waste will be segregated for characterization and appropriate disposal.

Alternative 5.2 assumed groundwater monitoring would occur quarterly for five years then semi-annually through year 30; in practice, following the removal of refuse and underlying soil at Site 5, groundwater monitoring continue for a period of at least three years to demonstrate the success of the remedial action. The monitoring will be accomplished quarterly in the existing monitoring wells at Site 5. *The suite of analytes will consist at a minimum of those constituents identified at elevated concentrations in waste characterization, and/or sampling of the soil beneath the sites, and taking into consideration constituents detected at elevated concentrations in other media (landfill gas, soil adjacent to the sites, sediment, and surface water).* The monitoring data will be evaluated against the groundwater quality performance measure described below using a statistical method from among those described in 40 CFR 258.53 or 23 CCR 2550.7(e)(8). The performance measure is the water quality that corresponds to any concentration of contamination remaining in the soil. If groundwater quality impairment above the performance measure is detected, and determined to be caused by release from Site 5, the need for further remedial action will be evaluated to address this impairment.

2.7.5.3 *Alternative 5.3 - Landfill Excavation, Consolidation, Embankment and Capping*

Under this alternative, a portion of the landfill contents, that portion which currently occupies an intermittent stream channel and 100-year floodplain, would be excavated. Due to the limited extent of refuse within the stream channel and floodplain, no provisions were made for a PDI. Excavated materials would be consolidated onto the remaining landfill areas to the west and east of the stream channel. Once excavation had been started, it would continue until post-excavation "verification" soil samples indicated underlying soils are clean. Excavated areas would be recontoured to eliminate topographic depressions and then would be clean-closed. Engineered caps would be installed at the two remaining refuse areas. In order to protect the engineered caps from the intermittent stream's 100-year floodwaters, flood control measures, such as an embankment, would be installed. Passive gas vent wells would be installed to prevent pressure buildup of gases beneath the cap surface and to abate potential lateral migration of gases.

Alternative 5.3 assumed gas monitoring would occur quarterly for five years, then semi-annually through year 30; in practice, gas monitoring will be conducted quarterly until a frequency adjustment is proposed and approved by the ROD signatories. Alternative 5.3 assumed groundwater monitoring will be conducted quarterly for five years, then semi-annually through year 30; in practice, groundwater monitoring will be conducted quarterly until a frequency adjustment is proposed and approved by representatives of the ROD signatory agencies. A review of the monitoring frequency will be conducted no less than every five years.

Access restrictions would involve fencing and deed restrictions to preserve the integrity of the engineered cap. Deed restrictions would be imposed to prevent excavations and certain types of land use, such as farming, that are deemed inappropriate.

2.7.6 Site 6 Remedial Alternatives

Three alternatives were developed for possible application at Site 6.

2.7.6.1 *Alternative 6.1 - No-Action*

This alternative is the "no-action" alternative and is defined as the current site conditions with semi-annual groundwater monitoring for 5 years under the existing Base

groundwater monitoring program. At the end of the 5-year period, an evaluation would be performed to determine if continued groundwater monitoring would be necessary.

2.7.6.2 *Alternative 6.2 - Landfill Capping*

Under this alternative, a vegetative cover would be installed over the "north" and "south" landfills. Passive gas vent wells would be installed to prevent pressure buildup of gases beneath the cover surface and to abate potential lateral migration of gases.

Alternative 6.2 assumed gas monitoring would occur quarterly for five years, then semi-annually through year 30; in practice, gas monitoring will be conducted quarterly until a frequency adjustment is proposed and approved by the ROD signatories. Alternative 6.2 assumed groundwater monitoring will be conducted quarterly for five years, then semi-annually through year 30; in practice, groundwater monitoring would be conducted quarterly until a frequency adjustment is proposed and approved by representatives of the ROD signatory agencies. A review of monitoring frequency will be conducted no less than every five years.

Access restrictions would involve fencing and deed restrictions to preserve the integrity of the engineered cap. Deed restrictions would be imposed to prevent excavations and certain types of land use, such as farming, that are deemed inappropriate.

2.7.6.3 *Alternative 6.3 - Landfill Excavation and Consolidation*

Under this alternative, landfill refuse and associated soils would be excavated, transported to, and placed at the consolidation site (i.e., Site 4) with commercially available equipment.

Prior to excavation, the site would undergo a PDI to define the vertical extent of soils affected by landfill leachate. No contaminated soil will be left in place with concentrations of constituents that threaten water quality unless it is technically or economically infeasible to remove this soil. Technical or economic feasibility will be determined by the Air Force, in consultation with U.S. EPA and the State, based on the factors described in Porter Collogne § 13304 and 23 CCR § 2550.4, and subject to the signatory parties' authority in the Federal Facility Agreement and CERCLA §121. A Water Quality Assessment will be conducted using the Designated Level Methodology and V-LEACH, depending on the constituent, or other equivalent appropriate method to determine whether a threat to groundwater quality

remains. If a threat to groundwater quality remains, it will be addressed by consideration of alternative remedial actions. The site would then be recontoured to eliminate topographic depressions and clean-closed.

Following the removal of refuse and underlying soil at Site 6, groundwater monitoring continue for a period of at least three years to demonstrate the success of the remedial action. Alternative 6.3 assumed groundwater monitoring would occur quarterly for five years, then semi-annually through year 30; in practice, groundwater monitoring will be conducted quarterly until a performance measure is demonstrated to have been met for three consecutive years. The monitoring will be accomplished using the existing monitoring wells at Site 6 and in one additional well to be installed near the downgradient margin of the northern part of Site 6. The suite of analytes will consist at a minimum of those constituents identified at elevated concentrations in waste characterization, and/or sampling of the soil beneath the sites, and taking into consideration constituents detected at elevated concentrations in other media (landfill gas, soil adjacent to the sites, sediment, and surface water). The monitoring data will be evaluated against the groundwater quality performance measure described below using a statistical method from among those described in 40 CFR 258.53 or 23 CCR 2550.7(e)(8). The performance measure is the water quality that corresponds to any concentration of contamination remaining in the soil. If groundwater quality impairment above the performance measure is detected, and determined to be caused by release from Site 6, the need for further remedial action will be evaluated to address this impairment.

2.8 Summary of the Comparative Analysis of Alternatives

The remedial alternatives developed in the FFS were analyzed in detail using the nine evaluation criteria required by the NCP (Section 300.430(e)(7)). These criteria are classified as threshold criteria, primary balancing criteria, and modifying criteria. Threshold criteria are:

- overall protection of human health and the environment; and
- compliance with ARARs.

Primary balancing criteria are:

- long-term effectiveness and permanence;
- reduction of toxicity, mobility, or volume through treatment;
- short-term effectiveness;

- implementability; and
- cost.

Modifying criteria are:

- state/support agency acceptance; and
- community acceptance.

The resulting strengths and weaknesses of the alternatives were weighed to identify the alternative providing the best balance among the nine criteria for each landfill site. The nine criteria are summarized in the following sections.

2.8.1 Overall Protection of Human Health and the Environment

Overall protection of human health and the environment addresses whether or not a remedy provides adequate protection and describes how risks posed through each exposure route are eliminated, reduced, or controlled through treatment, engineering controls, or institutional controls.

2.8.1.1 Site 1 - Runway Overrun Landfill

Alternative 1.1 is the only alternative developed for this site. No refuse or contaminants were found during remedial activities. Therefore, no comparative analysis is necessary.

2.8.1.2 Site 2 - "8150" Area Landfill

The baseline risk assessment determined that current and future risk are within acceptable limits (i.e., between 10^{-4} and 10^{-6}) [IT 1993c]. Either Alternative 2.2 or 2.3 would provide protection of human health and the environment and therefore could be implemented. Alternative 2.2 reduces risk through controlling exposure pathways and natural degradation. Alternative 2.3 eliminates risk at Site 2 by removing the source. However, a higher potential exists for worker exposure to the refuse and associated soils during excavation and consolidation. This exposure can be controlled through development and implementation of appropriate health and safety procedures.

2.8.1.3 Site 3 - Northeast Perimeter Landfill No. 1

The baseline risk assessment determined that current and future risk are within acceptable limits (i.e., between 10^{-4} and 10^{-6}) [IT 1993c]. Therefore, either Alternative 3.2 or 3.3 could be implemented. Alternative 3.2 offers a higher degree of

protection of human health and the environment than Alternative 3.3 since there is no excavation which results in potential contact with refuse. Alternative 3.2 reduces risk through controlling exposure pathways and natural degradation. Alternative 3.3 eliminates risk at Site 3 by removing the source. However, a higher potential exists for worker exposure to the refuse and associated soils during excavation and consolidation. This exposure can be controlled through development and implementation of appropriate health and safety procedures.

2.8.1.4 *Site 4 - Northeast Perimeter Landfill No. 2*

The baseline risk assessment determined that current and future risk are within acceptable limits (i.e., between 10^{-4} and 10^{-6}) [IT 1993c]. Either Alternative 4.2 or 4.3 would provide protection of human health and the environment and therefore could be implemented. Alternative 4.2 offers a higher degree of protection of human health and the environment than Alternative 4.3 since there is no excavation which results in potential contact with refuse. Alternative 4.3 potentially exposes workers to refuse and associated soils during excavation and consolidation. However, this exposure can be controlled through development and implementation of appropriate health and safety procedures.

2.8.1.5 *Site 5 - Northeast Perimeter Landfill No. 3*

The baseline risk assessment determined that current and future risk are within acceptable limits (i.e., between 10^{-4} and 10^{-6}) [IT 1993c]. Either Alternative 5.2 or 5.3 would provide protection of human health and the environment and therefore could be implemented. Alternative 5.3 offers a higher degree of protection of human health and the environment than Alternative 5.2 since less refuse is excavated and risk is reduced through control of exposure pathways and natural degradation. Alternative 5.2 eliminates risk at Site 5 by removing the source. Both Alternatives 5.2 and 5.3 potentially expose workers to refuse and associated soils during excavation and consolidation. However, this exposure can be controlled through development and implementation of appropriate health and safety procedures.

2.8.1.6 *Site 6 - Firing Range Landfill Sites*

The baseline risk assessment determined that current and future risk are within acceptable limits (i.e., between 10^{-4} and 10^{-6}) [IT 1993c]. Either Alternative 6.2 or 6.3 would provide protection of human health and the environment and therefore could be implemented. Alternative 6.2 offers a higher degree of protection of human health and

the environment than Alternative 6.3 since no refuse is excavated and risk is reduced through control of exposure pathways and natural degradation. Alternative 6.3 eliminates risk at Site 6 by removing the source. The potential exists for worker exposure to the refuse and associated soils during excavation and consolidation. However, exposure can be controlled through development and implementation of appropriate health and safety procedures.

2.8.2 Compliance with ARARs

2.8.2.1 ARAR Definitions

Pursuant to Section 121(d)(1) of CERCLA [42 USC Section 9621(d)], remedial actions must attain a degree of cleanup which assures protection of human health and the environment. Additionally, remedial actions that leave hazardous substances, pollutants, or contaminants on site must meet standards, requirements, limitations, or criteria that are ARARs. Federal ARARs may include requirements under any federal environmental laws. State ARARs include promulgated requirements under State environmental or facility-siting laws that are more stringent than federal ARARs and that have been identified to U.S. EPA by the State in a timely manner.

Applicable requirements are those clean-up standards, control standards, and other substantive environmental protection requirements, criteria, or limitations promulgated under federal or State law that specifically address a hazardous substance, pollutant, contaminant, remedial action, location, or other circumstances at a CERCLA site.

Relevant and appropriate requirements include those that, while not "applicable" to a hazardous substance, pollutant, contaminant, remedial action, location, or other circumstances at a CERCLA site, nevertheless address problems or situations sufficiently similar to those encountered at the CERCLA site to indicate their use is well-suited to the particular site. A requirement must be both relevant and appropriate to be designated an ARAR. If no ARAR addresses a particular situation, or if an ARAR is insufficient to protect human health or the environment, then nonpromulgated standards, criteria, guidance, and to-be-considered (TBC) advisories may be used to provide a protective remedy.

ARARs are identified on a site-specific basis from information about specific chemicals at the site, specific actions that are being considered as remedies, and specific features of the site location. There are three categories of ARARs:

- Chemical-specific ARARs are numerical values or methodologies which, when applied to site-specific conditions, result in the establishment of numerical values. They are used to determine acceptable concentrations of specific hazardous substances, pollutants, and contaminants in the environment;
- Location-specific ARARs are restrictions placed on the concentration of hazardous substances or the conduct of activities solely because the site occurs in a special location, such as a wetland or floodplain; and
- Action-specific ARARs are technology- or activity-based requirements or limitations on actions taken with respect to hazardous waste.

The ARARs and TBCs were developed using the following guidelines and documents: CERCLA Compliance with Other Laws Manual, Part I (Interim Final) [EPA 1988]; CERCLA Compliance with Other Laws Manual, Part II: Clean Water Act and Other Environmental Statutes and State Requirements [EPA 1989c]; and California State Water Resources Control Board ARARs Under CERCLA [SWRCB 1992]. The following sections outline the ARARs and other information considered for the Landfill OU sites.

The Federal ARARs are summarized in Table 2.42. The State ARARs are summarized in Table 2.43.

Table 2.42 Mather AFB Landfill Operable Unit Federal ARARs^(a)

Source	Standard, Requirement, Criterion, or Limitation	ARAR Status	Description	Comment	Associated Site(s)
Resource Conservation and Recovery Act, Subtitle D	40 Code of Federal Regulation (CFR) 258.10	Relevant and Appropriate (if definition of airport is met)	Airport Safety: Municipal Solid Waste Landfills (MSWLF) units that are located within 10,000 feet of the end of a runway used by turbojet aircraft must be designed and operated so that the unit does not pose a bird hazard to the aircraft	Applies to new, existing, or lateral expansion MSWLF. The operation at Site 4 does not fit the definitions of "New," "Existing," or "Lateral Expansion," thus the regulations that specifically apply to new, existing, or lateral expansion MSWLF are not applicable to Site 4. However airport safety is relevant and appropriate because the consolidation of wastes at Site 4 is sufficiently similar to MSWLF operations to cause a potential bird safety issue. Further Site 4 is approximately 4,000 feet northeast of the end of the runway.	3, 4
Resource Conservation and Recovery Act, Subtitle D	40 CFR 258.12	Relevant and Appropriate	Wetlands: The construction of a new MSWLF or lateral expansion of an existing MSWLF will not cause or contribute to the degradation of a wetland as a result of erosion, stability, or migration of materials; cause or contribute to a violation of a water quality standard, violate the toxic effluent standard under the Clean Water Act, jeopardize the existence of endangered or threatened species or their habitats	This regulation is relevant and appropriate because there are three vernal pools west of Site 4.	4

- (a) The requirements of the Federal Resource Conservation and Recovery Act Subtitle D program in 40 CFR Part 258 et. seq. are the ARARs for the Sites 2, 3, and 4, unless the requirement in the State, Subtitle D regulations in Title 23, California Code of Regulations, Division 3, Chapter 15, and Title 14 California Code of Regulations, Division 7, Chapter 3 is more stringent, and in that event, the State requirement is the ARAR.

Table 2.42 Mather AFB Landfill Operable Unit Federal ARARs^(a)

Source	Standard, Requirement, Criterion, or Limitation	ARAR Status	Description	Comment	Associated Site(s)
Resource Conservation and Recovery Act, Subtitle D	40 CFR 258.20	Applicable	Procedures for Excluding the Receipt of Hazardous Waste: All MSWLF receiving waste after October 9, 1991 (herein referred to as "operating MSWLF") must have a program to exclude hazardous waste and Polychlorinated Biphenyls from disposal at the site. This program must include random inspections or another method to ensure incoming loads do not contain these wastes. This requirement is applicable to Site 4 because it will be receiving waste from landfill sites 5 and 6	The wastes from Sites 5 and 6 are not expected to contain hazardous wastes based on analysis of the sampling results and histories of these sites. However, the possibility of hazardous wastes being encountered in the excavated wastes can not be excluded.	4
Resource Conservation and Recovery Act, Subtitle D	40 CFR 258.21	Applicable	Cover Material Requirements: To control disease vectors, fires, odors, blowing litter, and scavenging, all operating MSWLFs must be covered with six inches of earthen material (or equivalent) at the end of the day or more frequently if necessary	Wastes from Sites 5 and 6 are expected to be comparable to municipal wastes. Thus cover materials at Site 4, the site where consolidation will occur, would need to limit disease vectors, fires, odors, blowing litter and scavenging that are associated with uncontrolled municipal waste disposal.	4
Resource Conservation and Recovery Act, Subtitle D	40 CFR 258.22	Applicable	Disease Vector Control: Rodents, flies, mosquitoes, and other animals that are capable of transmitting diseases to humans must be prevented or populations controlled at all MSWLF.	Consolidation of wastes at Site 4 might attract disease vectors unless they are controlled.	4

(a) The requirements of the Federal Resource Conservation and Recovery Act Subtitle D program in 40 CFR Part 258 et. seq. are the ARARs for the Sites 2, 3, and 4, unless the requirement in the State, Subtitle D regulations in Title 23, California Code of Regulations, Division 3, Chapter 15, and Title 14 California Code of Regulations, Division 7, Chapter 3 is more stringent, and in that event, the State requirement is the ARAR.

Table 2.42 Mather AFB Landfill Operable Unit Federal ARARs^(a)

Source	Standard, Requirement, Criterion, or Limitation	ARAR Status	Description	Comment	Associated Site(s)
Resource Conservation and Recovery Act, Subtitle D	40 CFR 258.23	Applicable	Explosive Gas Control: Monitoring and control of methane is required at all MSWLF. The concentration of methane must not exceed 25% of the lower explosive limit (LEL) in facility structures and must be at or below the LEL at the facility property boundary.	Methane has been measured in the landfill gases generated at Site 4. The materials to be excavated from Sites 5 and 6 may also generate methane when consolidated at Site 4.	4
Resource Conservation and Recovery Act, Subtitle D	40 CFR 258.24	Applicable	Air Criteria: Gas emissions from the landfill must not result in a violation of an air quality standard developed under a State Implementation Plan for the Federal Clean Air Act. Applies to all MSWLFs.		4
Resource Conservation and Recovery Act, Subtitle D	40 CFR 258.25	Applicable	Access Requirements: Natural or artificial barriers must be used to prevent unauthorized vehicle traffic and illegal dumping and to control public access to all MSWLFs.	Site 4 is located in a portion of the Base that is near an area that has been designated for public access as a regional park.	4
Resource Conservation and Recovery Act, Subtitle D	40 CFR 258.26	Applicable	Run-on/Run-Off Control Systems: A run-on and run-off system must be designed to handle the potential flow from a 24-hour, 25-year storm		4
Resource Conservation and Recovery Act, Subtitle D	40 CFR 258.28(a)	Applicable	Liquid Restrictions: Bulk and noncontainerized wastes can not be added to any MSWLF except septic waste from a household. Leachate and condensate derived from the MSWLF can be placed in the unit if the unit has a composite linear and leachate collection system.		4

(a) The requirements of the Federal Resource Conservation and Recovery Act Subtitle D program in 40 CFR Part 258 et. seq. are the ARARs for the Sites 2, 3, and 4, unless the requirement in the State, Subtitle D regulations in Title 23, California Code of Regulations, Division 3, Chapter 15, and Title 14 California Code of Regulations, Division 7, Chapter 3 is more stringent, and in that event, the State requirement is the ARAR.

Table 2.42 Mather AFB Landfill Operable Unit Federal ARARs^(a)

Source	Standard, Requirement, Criterion, or Limitation	ARAR Status	Description	Comment	Associated Site(s)
Resource Conservation and Recovery Act, Subtitle D	40 CFR 258.28(b)	Applicable - A waiver may be needed because you can not tell if the origin was "household waste"	Liquid Restrictions: Containerized liquids placed into a MSWLF must met three restrictions: 1) the containers must be similar in size to that normally found in household waste; 2) the container is designed to hold liquids for use other than storage; 3) or the waste is household waste		4
Resource Conservation and Recovery Act, Subtitle D	40 CFR 258.51	Applicable	Groundwater Monitoring Systems: A groundwater monitoring system must be installed that characterizes the upper aquifer. More than one unit may be monitored by the same system if the hydrogeological setting is appropriate. The system must include a sufficient number of wells positioned in locations to characterize the quality of groundwater in unaffected area (i.e., background) and at either a point of compliance or at the unit boundary. Monitoring wells must be constructed to provide representative samples and prevent contamination from surface sources of chemicals.		4

(a) The requirements of the Federal Resource Conservation and Recovery Act Subtitle D program in 40 CFR Part 258 et. seq. are the ARARs for the Sites 2, 3, and 4, unless the requirement in the State, Subtitle D regulations in Title 23, California Code of Regulations, Division 3, Chapter 15, and Title 14 California Code of Regulations, Division 7, Chapter 3 is more stringent, and in that event, the State requirement is the ARAR.

Table 2.42 Mather AFB Landfill Operable Unit Federal ARARs^(a)

Source	Standard, Requirement, Criterion, or Limitation	ARAR Status	Description	Comment	Associated Site(s)
Resource Conservation and Recovery Act, Subtitle D	40 CFR 258.60(a) and (b)	Applicable	Closure Criteria: All MSWLF must install a final cover to minimize infiltration and erosion. The cover must: have a permeability of permeability of 0.00001 cm/sec or less; have an infiltration layer containing a minimum of 18-inches of earthen materials; and have an erosion layer with a minimum of 6-inches of earthen materials that is capable of sustaining native plant growth. Alternative designs may be approved if they meet the performance standards for minimization of infiltration, wind erosion, and water erosion.		4
Resource Conservation and Recovery Act, Subtitle D	40 CFR 258.60(f) and (g)	Applicable	Closure Criteria: All MWSLF must begin closure 30-days after the receipt of the final load of waste. The closure activities must be complete within 180 days unless an exemption has been granted and all steps are taken to prevent threats to human health and the environment.		4
Resource Conservation and Recovery Act, Subtitle D f	40 CFR 258.60(i)	Applicable (for Site 4) and Relevant and Appropriate (for Sites 2 and 3)	Closure Criteria: Following closure a notification must be added to the deed or equivalent instrument to notify a purchaser that the property was used as a landfill.	As of 1994 there are no deeds to the Mather Air Force Base (AFB) property. Notification of the property use is planned to be added to the transfer records.	4: Applicable 2 and 3: Relevant and Appropriate

(a) The requirements of the Federal Resource Conservation and Recovery Act Subtitle D program in 40 CFR Part 258 et. seq. are the ARARs for the Sites 2, 3, and 4, unless the requirement in the State, Subtitle D regulations in Title 23, California Code of Regulations, Division 3, Chapter 15, and Title 14 California Code of Regulations, Division 7, Chapter 3 is more stringent, and in that event, the State requirement is the ARAR.

Table 2.42 Mather AFB Landfill Operable Unit Federal ARARs^(a)

Source	Standard, Requirement, Criterion, or Limitation	ARAR Status	Description	Comment	Associated Site(s)
Resource Conservation and Recovery Act, Subtitle D	40 CFR 258.61(a)(1), 40 CFR 258.61(a)(3), & 40 CFR 258.61(a)(4)	Applicable (for Site 4) and Relevant and Appropriate (for Sites 2 and 3)	Post-Closure Care Requirements: For a period of 30 years (unless determined that another period is appropriate), the final cover and gas collection system must be maintained. Further groundwater must be monitored pursuant to the groundwater monitoring requirements identified in 40 CFR 258.50 - 258.58.	<p>Waste will be added to Site 4 following the applicable date for Subtitle D (i.e., October 9, 1991), thus it is applicable.</p> <p>The post-closure requirements are considered relevant and appropriate for Sites 2 and 3 because they were used for the disposal of municipal solid waste prior to the passage of RCRA Subtitle D. Further, the requirements for post-closure address systems (final covers, gas venting wells, and groundwater monitoring networks) that are being planned as part of the closure of these sites.</p> <p>Maintenance of a leachate collection system (40 CFR 258.61(a)(2) has not been identified as an applicable or relevant and appropriate requirement (ARAR) for Sites 2, 3, or 4. Because there are no leachate collection systems in the final remedial alternative.</p>	4: Applicable 2 and 3: Relevant and Appropriate

(a) The requirements of the Federal Resource Conservation and Recovery Act Subtitle D program in 40 CFR Part 258 et. seq. are the ARARs for the Sites 2, 3, and 4, unless the requirement in the State, Subtitle D regulations in Title 23, California Code of Regulations, Division 3, Chapter 15, and Title 14 California Code of Regulations, Division 7, Chapter 3 is more stringent, and in that event, the State requirement is the ARAR.

Table 2.42 Mather AFB Landfill Operable Unit Federal ARARs^(a)

Source	Standard, Requirement, Criterion, or Limitation	ARAR Status	Description	Comment	Associated Site(s)
Clean Water Act, Section 404	Subsection B, Appendix A to Part 330, 33 CFR 330	Applicable	Nationwide Permit No. 38, Cleanup of Hazardous and Toxic Wastes (Nationwide Permit from the U.S. Army Corps of Engineers for work in wetlands and other water): Cleanup activities that may involve containment, stabilization, or removal of hazardous or toxic wastes would need to delineate wetlands prior to field operations.	Hazardous waste may be present in the landfills at Mather AFB. Vernal pools, a type of wetland, are located between sites 3 and 4. The extent of these pools have been mapped. Some refuse to be excavated at Site 5 lies beneath an intermittent drainage. Site 6 is adjacent to a drainage.	3, 4, 5 and 6
Clean Water Act, Section 404	Subsection C, Appendix A to Part 330, 33 CFR 330	Applicable	Nationwide Permit Conditions: The following conditions/practices must be followed: any structure or fill shall be maintained, including maintenance to ensure public safety; erosion and siltation controls must be used and maintained during construction and all fills must be permanently stabilized at the earliest practicable date; heavy equipment working in wetlands must be placed on mats or other measures must be taken to minimize soil disturbances; no activity conducted under a nationwide permit must jeopardize the continued existence of a threatened or endangered species or a species proposed for designation	Vernal pools are located between sites 3 and 4 and possibly near Site 6; site 5 and 6 are near drainage channels. In addition, the tadpoles of the western spadefoot frog, a species of concern in California, although not either an endangered or threatened species, have been seen near Site 6.	3, 4, 5 and 6
Clean Water Act, Section 404	40 CFR 230.10(a) to 230.10(c)	Applicable	Restrictions on Discharge: If there is a practicable alternative that would have a lesser impact on the wetlands, fill materials should not be discharged at the wetland. Any discharge that occurs should not cause a violation of a state water quality objective or a significant degradation of water quality.	Vernal pools are located between sites 3 and 4, and possibly near Site 6. Site 5 intersects a drainage channel, and Site 6 is adjacent to a drainage channel	3, 4, 5 and 6

(a) The requirements of the Federal Resource Conservation and Recovery Act Subtitle D program in 40 CFR Part 258 et. seq. are the ARARs for the Sites 2, 3, and 4, unless the requirement in the State, Subtitle D regulations in Title 23, California Code of Regulations, Division 3, Chapter 15, and Title 14 California Code of Regulations, Division 7, Chapter 3 is more stringent, and in that event, the State requirement is the ARAR.

Table 2.42 Mather AFB Landfill Operable Unit Federal ARARs^(a)

Source	Standard, Requirement, Criterion, or Limitation	ARAR Status	Description	Comment	Associated Site(s)
Clean Water Act, Section 404	40 CFR 230.70 - 230.77 (Subpart H: Actions to Minimize Adverse Impacts)	Applicable	The project should be designed to minimize potential adverse effects, considering the following issues: 1) Discharge Location 2) Material to Be Discharged 3) Control of Discharged Material after Discharge 4) Technologies Used 5) Plant and Animal Populations 6) Other potential adverse effects	Vernal pools occur between sites 3 and 4, and possibly near Site 6. Site 5 intersects a drainage channel and Site 6 is adjacent to a drainage channel. Earth moving and recontouring will occur at all sites.	3, 4, 5, and 6
Endangered Species Act	50 CFR 222, 226, 227, and 402	Applicable	The remedial actions at the Landfill OU sites may impact endangered species. All procedures must ensure that substantive regulatory requirements are followed to avoid or mitigate impacts.		2, 3, 4, 5, and 6

(a) The requirements of the Federal Resource Conservation and Recovery Act Subtitle D program in 40 CFR Part 258 et. seq. are the ARARs for the Sites 2, 3, and 4, unless the requirement in the State, Subtitle D regulations in Title 23, California Code of Regulations, Division 3, Chapter 15, and Title 14 California Code of Regulations, Division 7, Chapter 3 is more stringent, and in that event, the State requirement is the ARAR.

Table 2.43 Mather AFB Landfill Operable Unit State ARARs¹

Source	Standard, Requirement, Criterion, or Limitation	ARAR Status	Description	Comment	Associated Site(s)
California Integrated Waste Management Act of 1989 Public Resource Code Section 40502 Section 43020	14 CCR 17766 Title 14, CCR, Division 7, Chapter 3, Article 7.8 Disposal Site Closure and Postclosure Maintenance	Applicable for Site 4 Relevant and Appropriate for Sites 2 & 3 ³	Emergency Response Plan (ERP): potential emergency conditions that may exceed the design of the site and could endanger the public health or environment must be anticipated. Response procedures for these conditions must be addressed in the RD/RA plans.	Closure or Postclosure Maintenance Standard of Title 14, CCR, Division 7, Chapter 3, Article 7.8. Scope and Applicability pursuant to 14 CCR 17760.	2 & 3 ³ : Relevant and Appropriate 4: Applicable
California Integrated Waste Management Act of 1989 Public Resource Code Section 40502 Section 43020	14 CCR 17767 ² Title 14, CCR, Division 7, Chapter 3, Article 7.8 Disposal Site Closure and Postclosure Maintenance	Applicable for Site 4 Relevant and Appropriate for Sites 2 & 3 ³	Security at Closed Sites: all points of access to the site must be restricted, except permitted entry points. All monitoring, control, and recovery systems shall be protected from unauthorized access	Closure or Postclosure Maintenance Standard of Title 14, CCR, division 7, Chapter 3, Article 7.8. Scope and Applicability pursuant to 14 CCR 17760.	2 & 3 ³ : Relevant and Appropriate 4: Applicable

- 1: The State does not agree on the characterizations of certain ARARs in this table to be "Relevant and Appropriate" instead of "Applicable." However since these requirements are included in the ROD as ARAR, the State will not dispute this ROD.
- 2: The requirements of the Federal RCRA Subtitle D program in 40 CFR Part 258 et seq. are the ARARs for landfills 2,3, and 4, unless the requirement in the State Subtitle D regulations in 23 CCR, Div. 3, Ch. 15, or 14 CCR, Div. 7, Ch. 3 is more stringent, and in that event, the state requirement is the ARAR.
- 3: Identification of provisions of Title 14 CCR, Chapter 3, Article 7.8 as "Relevant and Appropriate" to Sites 2 & 3 is subject to consistency with the selected remedial alternative for each site.
- 4: U.S. EPA believes this requirement of Chapter 15 is applicable only because Site 4 is now subject to the state Subtitle D Regulations in Chapter 15.

Table 2.43 Mather AFB Landfill Operable Unit State ARARs¹

Source	Standard, Requirement, Criterion, or Limitation	ARAR Status	Description	Comment	Associated Site(s)
California Integrated Waste Management Act of 1989 Public Resource Code Section 40502 Section 43020	14 CCR 17773(b) to 17773(e) ² Title 14, CCR, Division 7, Chapter 3, Article 7.8 Disposal Site Closure and Postclosure Maintenance	Applicable for Site 4 Relevant and Appropriate for Sites 2 & 3 ³	Final Cover: the design and construction of the final cover must meet specific prescriptive standards. These include minimum thickness and quality of the construction material (14 CCR 17773(b) and (e))	Closure or Postclosure Maintenance Standard of Title 14, CCR, Division 7, Chapter 3, Article 7.8. Scope and Applicability pursuant to 14 CCR 17760.	2 & 3 ³ : Relevant and Appropriate 4: Applicable
California Integrated Waste Management Act of 1989 Public Resource Code Section 40502 Section 43020	14 CCR 17774(a) & 17774(c) to 17774(h) ² Title 14, CCR, Division 7, Chapter 3, Article 7.8 Disposal Site Closure and Postclosure Maintenance	Applicable for Site 4 Relevant and Appropriate for Sites 2 & 3 ³	Construction Quality Assurance (CQA): a CQA program must be designed and implemented. It must include specific parameters (and for some components specific testing methods) for each component of the final cover.	Closure or Postclosure Maintenance Standard of Title 14, CCR, Division 7, Chapter 3, Article 7.8. Scope and Applicability pursuant to 14 CCR 17760.	2 & 3 ³ : Relevant and Appropriate 4: Applicable
California Integrated Waste Management Act of 1989 Public Resource Code Section 40502 Section 43020	14 CCR 17776(a); (c); substantive requirements of (d); (e) & (f) ² Title 14, CCR, Division 7, Chapter 3, Article 7.8 Disposal Site Closure and Postclosure Maintenance	Applicable for Site 4 Relevant and Appropriate for Sites 2 & 3 ³	Final Grades: the final grades for the covered landfill must meet grading standards provided in 23 CCR 2581, they must be appropriate to control runoff and erosion.	Closure or Postclosure Maintenance Standard of Title 14, CCR, Division 7, Chapter 3, Article 7.8. Scope and Applicability pursuant to 14 CCR 17760.	2 & 3 ³ : Relevant and Appropriate 4: Applicable
California Integrated Waste Management Act of 1989 Public Resource Code Section 40502 Section 43020	14 CCR 17777(a) & 17777(b), and substantive content of 17777(c) ² Title 14, CCR, Division 7, Chapter 3, Article 7.8 Disposal Site Closure and Postclosure Maintenance	Applicable for Site 4 Relevant and Appropriate for Sites 2 & 3 ³	Final Site Face: the design of the final site face must provide for the integrity of the final cover both under static and dynamic conditions.	Closure or Postclosure Maintenance Standard of Title 14, CCR, Division 7, Chapter 3, Article 7.8. Scope and Applicability pursuant to 14 CCR 17760.	2 & 3 ³ : Relevant and Appropriate 4: Applicable

Table 2.43 Mather AFB Landfill Operable Unit State ARARs¹

Source	Standard, Requirement, Criterion, or Limitation	ARAR Status	Description	Comment	Associated Site(s)
California Integrated Waste Management Act of 1989 Public Resource Code Section 40502 Section 43020	14 CCR 17778(a), & 17778(c) to 17778(j) ² Title 14, CCR, Division 7, Chapter 3, Article 7.8 Disposal Site Closure and Postclosure Maintenance	Applicable for Site 4 Relevant and Appropriate for Sites 2 & 3 ³	Final Drainage: the design of the final cover must control runoff and runoff produced by a 100 year 24 hour storm event and must be prepared according to CQA requirements	Closure or Postclosure Maintenance Standard of Title 14, CCR, Division 7, Chapter 3, Article 7.8. Scope and Applicability pursuant to 14 CCR 17760.	2 & 3 ³ : Relevant and Appropriate 4: Applicable
California Integrated Waste Management Act of 1989 Public Resource Code Section 40502 Section 43020	14 CCR 17779(a), & 17779(c) to 17779(i) ² Title 14, CCR, Division 7, Chapter 3, Article 7.8 Disposal Site Closure and Postclosure Maintenance	Applicable for Site 4 Relevant and Appropriate for Sites 2 & 3 ³	Slope Protection and Erosion Control: the design and construction of the slopes must protect the integrity of the final cover and minimize soil erosion	Closure or Postclosure Maintenance Standard of Title 14, CCR, Division 7, Chapter 3, Article 7.8. Scope and Applicability pursuant to 14 CCR 17760.	2 & 3 ³ : Relevant and Appropriate 4: Applicable
California Integrated Waste Management Act of 1989 Public Resource Code Section 40502 Section 43020	14 CCR 17781 ² Title 14, CCR, Division 7, Chapter 3, Article 7.8 Disposal Site Closure and Postclosure Maintenance	Applicable for Site 4 Relevant and Appropriate for Sites 2 & 3 ³	Leachate Control During Closure and Post Closure: leachate must be monitored, collected, treated, and discarded appropriately	The state does not intend that subsurface leachate monitoring and collecting systems need to be added to existing landfills unless leachate production and/or accumulation is evident.	2 & 3 ³ : Relevant and Appropriate 4: Applicable
California Integrated Waste Management Act of 1989 Public Resource Code Section 40502 Section 43020	14 CCR 17783 ² Title 14, CCR, Division 7, Chapter 3, Article 7.8 Disposal Site Closure and Postclosure Maintenance	Applicable for Site 4 Relevant and Appropriate for 2 & 3 ³	Gas Monitoring and Control During Closure and Post Closure: landfill gases must be collected and analyzed; the concentration of combustible gas at the landfill boundary must be 5% or less, trace gases must be controlled to prevent adverse acute and chronic exposure to toxic and/or carcinogenic compounds	Monitoring should be conducted for 30 years or until authorized to be discontinued by showing that there is no potential for gas migration beyond the property boundary or into onsite structures, and that landfill gases do not pose a threat to public health and safety or a threat to the environment.	2 & 3 ³ : Relevant and Appropriate 4: Applicable

Table 2.43 Mather AFB Landfill Operable Unit State ARARs¹

Source	Standard, Requirement, Criterion, or Limitation	ARAR Status	Description	Comment	Associated Site(s)
California Integrated Waste Management Act of 1989 Public Resource Code Section 40502 Section 43020	14 CCR 17788 ² Title 14, CCR, Division 7, Chapter 3, Article 7.8 Disposal Site Closure and Postclosure Maintenance	Applicable for Site 4 Relevant and Appropriate for 2 & 3 ³	Post Closure Maintenance: the landfill must be maintained and monitored for no less than 30 years following closure	Monitoring is continued for 30 years following closure unless it can be demonstrated that the landfill does not pose a threat to public health and safety or a threat to the environment. If the threat has been eliminated, post-closure maintenance can be discontinued.	2 & 3 ³ : Relevant and Appropriate 4: Applicable
California Integrated Waste Management Act of 1989 Public Resource Code Section 40502 Section 43020	14 CCR 17796 ² Title 14, CCR, Division 7, Chapter 3, Article 7.8 Disposal Site Closure and Postclosure Maintenance	Applicable for Site 4 Relevant and Appropriate for 2, 3, 5 & 6 ³	Post Closure Land Use: Site Closure Design shall show one or more proposed uses of the closed site or show development that is compatible with open space	Closure or Postclosure Maintenance Standard of Title 14, CCR, Division 7, Chapter 3, Article 7.8. Scope and Applicability pursuant to 14 CCR 17760.	2, 3, 5, & 6 ³ : Relevant and Appropriate 4: Applicable
California Integrated Waste Management Act of 1989 Public Resources Code Sections 40502 and 43509	14 CCR 18262.3 ² Title 14, CCR, Chapter 5, Article 3.4 Closure and Postclosure Maintenance Plans	Applicable for Site 4 Relevant and Appropriate for 2 and 3	Provides the content requirements for closure plans for solid waste disposal sites.	Applies to solid waste disposal sites that received waste after January 1, 1988.	2 & 3 ³ : Relevant and Appropriate 4: Applicable
California Integrated Waste Management Act of 1989 Public Resources Code Sections 40502 and 43509	14 CCR 18265.3 ² Title 14, CCR, Chapter 5, Article 3.4 Closure and Postclosure Maintenance Plans	Applicable for Site 4 Relevant and Appropriate for Sites 2 and 3	Provides the content requirements for postclosure plans for solid waste disposal sites.	Applies to solid waste disposal sites that received waste after January 1, 1988.	2 and 3: Relevant and Appropriate 4: Applicable
California Integrated Waste Management Act of 1989 Public Resources Code Sections 40502, 43020, 43021 and 43030	14 CCR 17636 ² Title 14, CCR, Division 7, Chapter 3, Article 7.3 Disposal Site Records	Applicable	Weight/Volume Records: the weight or volume of waste accepted must be determined to an accuracy of $\pm 10\%$	Applies to solid waste disposal sites as defined by Public Resources Code Section 40122.	4

Table 2.43 Mather AFB Landfill Operable Unit State ARARs¹

Source	Standard, Requirement, Criterion, or Limitation	ARAR Status	Description	Comment	Associated Site(s)
California Integrated Waste Management Act of 1989 Public Resources Code Sections 40502, 43020, 43021 and 43030	14 CCR 17637 Title 14, CCR, Division 7, Chapter 3, Article 7.3 Disposal Site Records	Applicable	Subsurface Records: the length and depth of any cut(s) made in natural terrain where fill will be placed and the depth to groundwater must be determined and documented	Applies to solid waste disposal sites as defined by Public Resources Code Section 40122. While it is not planned that solid waste will be placed in cuts in native soil, clean fill will be used where refuse or contaminated soil has been excavated.	4
California Integrated Waste Management Act of 1989 Public Resources Code Sections 40502, 43020, 43021 and 43030	14 CCR 17658 ² Title 14, CCR, Division 7, Chapter 3, Article 7.4 Disposal Site Improvements	Applicable to Site 4 Relevant and Appropriate for Sites 5 & 6	Site Security: the perimeter of the landfill must be secured either through barriers or topographic constraints to discourage unauthorized entry	Applies to solid waste disposal sites as defined by Public Resources Code Section 40122.	4: Applicable 5 and 6: Relevant and Appropriate
California Integrated Waste Management Act of 1989 Public Resources Code Sections 40502, 43020, 43021 and 43030	14 CCR 17659 ² Title 14, CCR, Division 7, Chapter 3, Article 7.4 Disposal Site Improvements	Applicable to Site 4 Relevant and Appropriate for Sites 5 & 6	Access Roads: landfill roads must be reasonably smooth to minimize dust and tracking of materials onto public roads	Applies to solid waste disposal sites as defined by Public Resources Code Section 40122.	4: Applicable 5 and 6: Relevant and Appropriate
California Integrated Waste Management Act of 1989 Public Resources Code Sections 40502, 43020, 43021 and 43030	14 CCR 17676 Title 14, CCR, Division 7, Chapter 3, Article 7.5 Disposal Site Operations	Applicable	Confined Unloading: Requires limiting unloading area, controlling windblown materials, and deposition at toe of fill	Applies to solid waste disposal sites as defined by Public Resources Code Section 40122.	4
California Integrated Waste Management Act of 1989 Public Resources Code Sections 40502, 43020, 43021 and 43030	14 CCR 17677 ² Title 14, CCR, Division 7, Chapter 3, Article 7.5 Disposal Site Operations	Applicable	Spreading and Compacting: Requires spreading and compacting of refuse in layers	Applies to solid waste disposal sites as defined by Public Resources Code Section 40122.	4

Table 2.43 Mather AFB Landfill Operable Unit State ARARs¹

Source	Standard, Requirement, Criterion, or Limitation	ARAR Status	Description	Comment	Associated Site(s)
California Integrated Waste Management Act of 1989 Public Resources Code Sections 40502, 43020, 43021 and 43030	14 CCR 17678 ² Title 14, CCR, Division 7, Chapter 3, Article 7.5 Disposal Site Operations	Applicable	Slopes and Cuts: The slope of the working face shall be maintained at a ratio which will allow effective compaction of the wastes. The depth of cuts and slopes of trench sides shall not exceed specified horizontal to vertical ratios	Applies to solid waste disposal sites as defined by Public Resources Code Section 40122.	4
California Integrated Waste Management Act of 1989 Public Resources Code Sections 40502, 43020, 43021 and 43030	14 CCR 17680 ² Title 14, CCR, Division 7, Chapter 3, Article 7.5 Disposal Site Operations	Applicable	Stockpiling: Requires stockpiled cover material and unacceptable native materials to be placed so as not to cause problems or interference with operations	Applies to solid waste disposal sites as defined by Public Resources Code Section 40122.	4
California Integrated Waste Management Act of 1989 Public Resources Code Sections 40502, 43020, 43021 and 43030	14 CCR 17684 ² Title 14, CCR, Division 7, Chapter 3, Article 7.5 Disposal Site Operations	Applicable	Intermediate Cover: Requires cover on fill where no additional refuse will be deposited within 180 days.	Applies to solid waste disposal sites as defined by Public Resources Code Section 40122.	4
California Integrated Waste Management Act of 1989 Public Resources Code Sections 40502, 43020, 43021 and 43030	14 CCR 17686 ² Title 14, CCR, Division 7, Chapter 3, Article 7.5 Disposal Site Operations	Applicable to Site 4 Relevant & Appropriate to Sites 5 & 6	Scavenging: Scavenging is prohibited.	Applies to solid waste disposal sites as defined by Public Resources Code Section 40122.	4: Applicable 5 & 6: Relevant & Appropriate
California Integrated Waste Management Act of 1989 Public Resources Code Sections 40502, 43020, 43021 and 43030	14 CCR 17687 ² Title 14, CCR, Division 7, Chapter 3, Article 7.5 Disposal Site Operations	Applicable to Site 4 Relevant & Appropriate to Sites 5 & 6	Salvaging Permitted: Salvaging is permitted in a planned and controlled manner.	No salvage is currently foreseen as a part of the selected action, but it may be proposed depending on character of refuse exposed. Applies to solid waste disposal sites as defined by Public Resources Code Section 40122.	4: Applicable 5 & 6: Relevant & Appropriate

Table 2.43 Mather AFB Landfill Operable Unit State ARARs¹

Source	Standard, Requirement, Criterion, or Limitation	ARAR Status	Description	Comment	Associated Site(s)
California Integrated Waste Management Act of 1989 Public Resources Code Sections 40502, 43020, 43021 and 43030	14 CCR 17688 ² Title 14, CCR, Division 7, Chapter 3, Article 7.5 Disposal Site Operations	Applicable to Site 4 Relevant & Appropriate to Sites 5 & 6	Volume Reduction and Energy Recovery: Volume reduction and energy recovery are permitted in planned and controlled manners.	Applies to solid waste disposal sites as defined by Public Resources Code Section 40122.	4: Applicable 5 & 6: Relevant & Appropriate
California Integrated Waste Management Act of 1989 Public Resources Code Sections 40502, 43020, 43021 and 43030	14 CCR 17689 ² Title 14, CCR, Division 7, Chapter 3, Article 7.5 Disposal Site Operations	Applicable to Site 4 Relevant & Appropriate to Sites 5 & 6	Processing Area: Processing area shall be confined to greatest degree practicable.	Applies to solid waste disposal sites as defined by Public Resources Code Section 40122.	4: Applicable 5 & 6: Relevant & Appropriate
California Integrated Waste Management Act of 1989 Public Resources Code Sections 40502, 43020, 43021 and 43030	14 CCR 17690 <u>112</u> Title 14, CCR, Division 7, Chapter 3, Article 7.5 Disposal Site Operations	Applicable to Site 4 Relevant & Appropriate to Sites 5 & 6	Storage of Salvage: Salvage material must be safely isolated for storage.	No salvage is currently foreseen as a part of the selected action, but it may be proposed depending on character of refuse exposed. Applies to solid waste disposal sites as defined by Public Resources Code Section 40122.	4: Applicable 5 & 6: Relevant & Appropriate
California Integrated Waste Management Act of 1989 Public Resources Code Sections 40502, 43020, 43021 and 43030	14 CCR 17691 ² Title 14, CCR, Division 7, Chapter 3, Article 7.5 Disposal Site Operations	Applicable to Site 4 Relevant & Appropriate to Sites 5 & 6	Removal: Storage time for salvage materials shall be limited to a safe duration.	No salvage is currently foreseen as a part of the selected action, but it may be proposed depending on character of refuse exposed. Applies to solid waste disposal sites as defined by Public Resources Code Section 40122.	4: Applicable 5 & 6: Relevant & Appropriate

Table 2.43 Mather AFB Landfill Operable Unit State ARARs¹

Source	Standard, Requirement, Criterion, or Limitation	ARAR Status	Description	Comment	Associated Site(s)
California Integrated Waste Management Act of 1989 Public Resources Code Sections 40502, 43020, 43021 and 43030	14 CCR 17692 ² Title 14, CCR, Division 7, Chapter 3, Article 7.5 Disposal Site Operations	Applicable to Site 4 Relevant & Appropriate to Sites 5 & 6	Non-Salvageable Items: Items capable of impairing public health shall not be salvaged without approval by Enforcement Agency and local health entity.	No salvage is currently foreseen as a part of the selected action, but it may be proposed depending on character of refuse exposed. Applies to solid waste disposal sites as defined by Public Resources Code Section 40122.	4: Applicable 5 & 6: Relevant & Appropriate
California Integrated Waste Management Act of 1989 Public Resources Code Sections 40502, 43020, 43021 and 43030	14 CCR 17696 <u>112</u> Title 14, CCR, Division 7, Chapter 3, Article 7.5 Disposal Site Operations	Applicable to Site 4 Relevant & Appropriate to Sites 5 & 6	Operating Site Maintenance: The operator shall monitor and promptly repair deteriorated or defective conditions with respect to requirements of these standards.	Applies to solid waste disposal sites as defined by Public Resources Code Section 40122.	4: Applicable 5 & 6: Relevant & Appropriate
California Integrated Waste Management Act of 1989 Public Resources Code Sections 40502, 43020, 43021 and 43030	14 CCR 17701 ² Title 14, CCR, Division 7, Chapter 3, Article 7.6 Disposal Site Controls	Applicable to Site 4 Relevant & Appropriate to Sites 5, and 6	Nuisance Control: Each site shall be operated and maintained so as not to create a public nuisance.	Applies to solid waste disposal sites as defined by Public Resources Code Section 40122.	4: Applicable 5 & 6: Relevant & Appropriate
California Integrated Waste Management Act of 1989 Public Resources Code Sections 40502, 43020, 43021 and 43030	14 CCR 17703 ² Title 14, CCR, Division 7, Chapter 3, Article 7.6 Disposal Site Controls	Applicable to Site 4 Relevant & Appropriate to Sites 5, and 6	Fire Control: Operator shall take adequate measures for prompt fire control as required by local fire authorities.	Applies to solid waste disposal sites as defined by Public Resources Code Section 40122.	4: Applicable 5 & 6: Relevant & Appropriate

Table 2.43 Mather AFB Landfill Operable Unit State ARARs¹

Source	Standard, Requirement, Criterion, or Limitation	ARAR Status	Description	Comment	Associated Site(s)
California Integrated Waste Management Act of 1989 Public Resources Code Sections 40502, 43020, 43021 and 43030	14 CCR 17704 ² Title 14, CCR, Division 7, Chapter 3, Article 7.6 Disposal Site Controls	Applicable to Site 4 Relevant & Appropriate to Sites 5, and 6	Leachate Control: The operator shall take adequate steps to monitor, collect, treat, and effectively dispose of leachates	The state does not intend that subsurface leachate monitoring and collection systems need to be installed at existing sites unless there is evidence of leachate production and/or accumulation. Applies to solid waste disposal sites as defined by Public Resources Code Section 40122.	4: Applicable 5 & 6: Relevant & Appropriate
California Integrated Waste Management Act of 1989 Public Resources Code Sections 40502, 43020, 43021 and 43030	14 CCR 17705 ² Title 14, CCR, Division 7, Chapter 3, Article 7.6 Disposal Site Controls	Applicable to Site 4 Relevant & Appropriate to Sites 5, and 6	Gas Control: Landfill gas control may be required based on the monitoring results	Applies to solid waste disposal sites as defined by Public Resources Code Section 40122.	4: Applicable 5 & 6: Relevant & Appropriate
California Integrated Waste Management Act of 1989 Public Resources Code Sections 40502, 43020, 43021 and 43030	14 CCR 17706 ² Title 14, CCR, Division 7, Chapter 3, Article 7.6 Disposal Site Controls	Applicable to Site 4 Relevant & Appropriate to Sites 5, and 6	Dust Control: The operator shall take adequate measures to minimize the creation of dust.	Applies to solid waste disposal sites as defined by Public Resources Code Section 40122.	4: Applicable 5 & 6: Relevant & Appropriate
California Integrated Waste Management Act of 1989 Public Resources Code Sections 40502, 43020, 43021 and 43030	14 CCR 17707 ² Title 14, CCR, Division 7, Chapter 3, Article 7.6 Disposal Site Controls	Applicable to Site 4 Relevant & Appropriate to Sites 5, and 6	Vector and Bird Control: The operator shall take adequate measures to control or prevent the propagation, harborage, or attraction of flies, rodents, or other vectors, and to minimize bird problems.	Applies to solid waste disposal sites as defined by Public Resources Code Section 40122.	4: Applicable 5 & 6: Relevant & Appropriate

Table 2.43 Mather AFB Landfill Operable Unit State ARARs¹

Source	Standard, Requirement, Criterion, or Limitation	ARAR Status	Description	Comment	Associated Site(s)
California Integrated Waste Management Act of 1989 Public Resources Code Sections 40502, 43020, 43021 and 43030	14 CCR 17708 ² Title 14, CCR, Division 7, Chapter 3, Article 7.6 Disposal Site Controls	Applicable to Site 4 Relevant & Appropriate to Sites 5 and 6	Drainage And Erosion Control: Adequate drainage shall be provided. Effects of erosion shall be promptly repaired and steps taken to prevent further occurrence.	Applies to solid waste disposal sites as defined by Public Resources Code Section 40122.	4: Applicable 5 & 6: Relevant & Appropriate
California Integrated Waste Management Act of 1989 Public Resources Code Sections 40502, 43020, 43021 and 43030	14 CCR 17709 ² Title 14, CCR, Division 7, Chapter 3, Article 7.6 Disposal Site Controls	Applicable to Site 4 Relevant & Appropriate to Sites 5 & 6	Contact with Water: No solid waste shall be deposited in direct contact with surface water.	Applies to solid waste disposal sites as defined by Public Resources Code Section 40122.	4: Applicable 5 & 6: Relevant & Appropriate
California Integrated Waste Management Act of 1989 Public Resources Code Sections 40502, 43020, 43021 and 43030	14 CCR 17710 ² Title 14, CCR, Division 7, Chapter 3, Article 7.6 Disposal Site Controls	Applicable to Site 4 Relevant & Appropriate to Sites 5 and 6	Grading of Fill Surface: Covered surfaces of the disposal area shall be graded to promote run-off and prevent ponding, accounting for future settlement.	Applies to solid waste disposal sites as defined by Public Resources Code Section 40122.	4: Applicable 5 & 6: Relevant & Appropriate
California Integrated Waste Management Act of 1989 Public Resources Code Sections 40502, 43020, 43021 and 43030	14 CCR 17711 ² Title 14, CCR, Division 7, Chapter 3, Article 7.6 Disposal Site Controls	Applicable to Site 4 Relevant & Appropriate to Sites 5 and 6	Litter Control: Litter and loose materials shall be routinely collected and disposed of properly.	Applies to solid waste disposal sites as defined by Public Resources Code Section 40122.	4: Applicable 5 & 6: Relevant & Appropriate
California Integrated Waste Management Act of 1989 Public Resources Code Sections 40502, 43020, 43021 and 43030	14 CCR 17712 ² Title 14, CCR, Division 7, Chapter 3, Article 7.6 Disposal Site Controls	Applicable to Site 4 Relevant & Appropriate to Sites 5, and 6	Noise Control: Noise shall be controlled to prevent health hazards to persons using the site.	Applies to solid waste disposal sites as defined by Public Resources Code Section 40122.	4: Applicable 5 & 6: Relevant & Appropriate

Table 2.43 Mather AFB Landfill Operable Unit State ARARs¹

Source	Standard, Requirement, Criterion, or Limitation	ARAR Status	Description	Comment	Associated Site(s)
California Integrated Waste Management Act of 1989 Public Resources Code Sections 40502, 43020, 43021 and 43030	14 CCR 17713 ² Title 14, CCR, Division 7, Chapter 3, Article 7.6 Disposal Site Controls	Applicable to Site 4 Relevant & Appropriate to Sites 5, and 6	Odor Control: The disposal site shall not be a source of odor nuisances.	Applies to solid waste disposal sites as defined by Public Resources Code Section 40122.	4: Applicable 5 & 6: Relevant & Appropriate
California Integrated Waste Management Act of 1989 Public Resources Code Sections 40502, 43020, 43021 and 43030	14 CCR 17741 ² Title 14, CCR, Division 7, Chapter 3, Article 7.6 Disposal Site Controls	Applicable Relevant & Appropriate to Sites 5 and 6	Burning Wastes: Burning wastes shall be extinguished.	Applies to solid waste disposal sites as defined by Public Resources Code Section 40122.	4: Applicable 5 & 6: Relevant & Appropriate
California Integrated Waste Management Act of 1989 Public Resources Code Sections 40502, 43020, 43021 and 43030	14 CCR 18222 Title 14, CCR, Division 7, Chapter 5, Article 3.2 Reports of Facility Information	Applicable to Site 4 Relevant & Appropriate for Sites 5& 6	Report of Disposal Site Information: The planning and procedural requirements necessary to ensure that solid waste is handled and disposed in manners that protect public health and safety and the environment must be conducted.	Applies to operating solid waste disposal sites as defined by Public Resources Code Section 40122.	4: Applicable 5 & 6: Relevant and Appropriate
Porter-Cologne Water Quality Control Act (California Water Code Sections 13240, 13241, 13242, 13243)	Water Quality Control Plan (Basin Plan) for the CVRWQCB.	Applicable	Establishes water quality objectives, including narrative and numerical standards, that protect the beneficial uses of surface and ground waters in the region. The designated beneficial uses are municipal and domestic; agricultural; and industrial supply.	Specific applicable portions of the Basin Plan include beneficial uses of affected water bodies and water quality objectives to protect those uses. Any activity, including, for example, a new discharge of contaminated soils or insitu treatment or containment of contaminated soils, that may affect water quality must not result in water quality exceeding water quality objectives.	2, 3, 4, 5, & 6

Table 2.43 Mather AFB Landfill Operable Unit State ARARs¹

Source	Standard, Requirement, Criterion, or Limitation	ARAR Status	Description	Comment	Associated Site(s)
Porter-Cologne Water Quality Control Act (California Water Code Sections 13000, 13140, 13240)	State Water Resources Control Board Resolution No. 88-63 ("Sources of Drinking Water Policy") (as contained in the RWQCB's Water Quality Control Plan)	Applicable	Specifies that, with certain exceptions, all ground and surface waters have the beneficial use of municipal or domestic water supply.	Applies in determining beneficial uses for waters that may be affected by discharges of waste.	2, 3, 4, 5, & 6
Porter-Cologne Water Quality Control Act (California Water Code Sections 13140, 13142, 13172)	State Water Resources Control Board Resolution No. 93-62	Applicable	Policy for regulation of discharges of municipal solid waste.	Applies to solid waste disposal sites.	4
Porter-Cologne Water Quality Control Act (California Water Code Sections 13140, 13172)	Regional Water Quality Control Board Order 93-200	Relevant & Appropriate	Promulgated order of the State Water Resources Control Board regulating operation and closure of solid waste disposal sites. Only substantive portions of this order that are consistent with the selective alternative are relevant and appropriate.	Applies to solid waste disposal sites.	4
Porter-Cologne Water Quality Control Act (California Water Code Sections 13140-13147, 13172, 13260, 13263, 13267, 13304)	Title 23, CCR, Section 2511(d)	Applicable	<p>Actions taken by or at the direction of public agencies to cleanup or abate conditions or nuisance resulting from unintentional or unauthorized releases of waste or pollutants to the environment are exempt from the provisions of Chapter 15 of Title 23 of the California Code of Regulations with the following provisions:</p> <p>1) Wastes removed from the immediate place of release must be discharged in accordance with the classification and siting requirements of Chapter 15; and,</p> <p>2) Remedial actions intended to contain wastes at the place of release shall implement applicable provisions of Chapter 15 to the extent feasible.</p>	Applies to all actions taken by or at the direction of public agencies to clean up unintentional or unauthorized discharges of waste to the environment.	2, 3, 4, 5, & 6

Table 2.43 Mather AFB Landfill Operable Unit State ARARs¹

Source	Standard, Requirement, Criterion, or Limitation	ARAR Status	Description	Comment	Associated Site(s)
Porter-Cologne Water Quality Control Act (California Water Code Sections 13140-13147, 13172, 13260, 13263, 13267, 13304)	Title 23, CCR, Section 2520(a) ²	Applicable	Requires that wastes identified as hazardous, designated, or nonhazardous solid waste (sections 2521, 2522 and 2523 of Article 2) be allowed only at waste management units which have been approved and classified.	Applies to discharges of waste to solid waste disposal sites, and storage sites.	Site 4 ⁴ and the wastes excavated from Sites 5 & 6
Porter-Cologne Water Quality Control Act (California Water Code Sections 13140-13147, 13172, 13260, 13263, 13267, 13304)	Title 23, CCR, Section 2520(b) ²	Applicable	Prohibits the discharge of wastes which have the potential to reduce or impair the integrity of containment structures or which, if commingled with other wastes in the unit, could produce violent reaction, heat or pressure, fire or explosion, toxic by-products, or reaction products which in turn: a. require a higher level of containment than provided by the unit; b. are restricted 'hazardous wastes'; or c. impair the integrity of containment structures.	Applies to discharges of waste to solid waste disposal sites.	4 ⁴
Porter-Cologne Water Quality Control Act (California Water Code Sections 13140-13147, 13172, 13260, 13263, 13267, 13304)	Title 23, CCR Section 2520(c) ²	Applicable to Site 4 and wastes from Sites 5, & 6 Relevant & Appropriate to Site 3	Requires accurate characterization of waste.	Applies to discharges of waste to solid waste disposal sites. Site 4 will be accepting wastes from Sites 5 & 6, so this provision is considered applicable to the wastes from the latter landfills. Excavated soils from other IRP sites on Mather may be used for the foundation layer at Site 3. These wastes must be appropriate for site conditions.	Sites 4 ⁴ and wastes from Sites 5 & 6: Applicable Site 3: Relevant and Appropriate

Table 2.43 Mather AFB Landfill Operable Unit State ARARs¹

Source	Standard, Requirement, Criterion, or Limitation	ARAR Status	Description	Comment	Associated Site(s)
Porter-Cologne Water Quality Control Act (California Water Code Sections 13140-13147, 13172, 13260, 13263, 13267, 13304)	Title 23, CCR, Section 2520(d) ²	Applicable to Site 4 and wastes from Sites 5, & 6	Requires management of liquids at classified waste management units.	Applies to discharges of waste to solid waste disposal sites.	Sites 4 ⁴ and wastes from Sites 5 & 6: Applicable
Porter-Cologne Water Quality Control Act (California Water Code Sections 13140-13147, 13172, 13260, 13263, 13267, 13304)	Title 23, CCR, Section 2521 ²	Applicable to Site 4 and wastes from Sites 5, & 6	Requires that hazardous waste be discharged to Class I waste management units.	Applies to discharges of hazardous waste to land for treatment, storage, or disposal.	Sites 4 ⁴ and wastes from Sites 5 & 6: Applicable
Porter-Cologne Water Quality Control Act (California Water Code Sections 13140-13147, 13172, 13260, 13263, 13267, 13304)	Title 23, CCR, Section 2522 ²	Applicable to Site 4 and wastes from Sites 5, & 6	Requires that designated waste be discharged to Class I or Class II waste management units.	Applies to discharges of designated waste (nonhazardous waste that could cause degradation of surface or ground waters) to land for treatment, storage, or disposal.	Sites 4 ⁴ and wastes from Sites 5 & 6: Applicable
Porter-Cologne Water Quality Control Act (California Water Code Sections 13140-13147, 13172, 13260, 13263, 13267, 13304)	Title 23, CCR, Section 2523 ²	Applicable to Site 4 and wastes from Sites 5, & 6	Requires that nonhazardous solid waste be discharged to a classified waste management unit.	Applies to discharges of nonhazardous solid waste to land for treatment, storage, or disposal.	Sites 4 ⁴ and wastes from Sites 5 & 6: Applicable

Table 2.43 Mather AFB Landfill Operable Unit State ARARs¹

Source	Standard, Requirement, Criterion, or Limitation	ARAR Status	Description	Comment	Associated Site(s)
Porter-Cologne Water Quality Control Act (California Water Code Sections 13140-13147, 13172, 13260, 13263, 13267, 13304)	Title 23, CCR, Section 2533(c) ²	Relevant & Appropriate	Requires that new landfills be designed, constructed, operated, and maintained to prevent inundation or washout due to floods with a 100-year return period.	Applies to the design, construction, operation, and maintenance of new solid waste disposal sites. Site 4 may be within the 100-year floodplain of an unnamed tributary of Morrison Creek.	2, 3, 4
Porter-Cologne Water Quality Control Act (California Water Code Sections 13140-13147, 13172, 13260, 13263, 13267, 13304)	Title 23, CCR, Section 2541(c) ²	Applicable to Site 4 Relevant & Appropriate to Site 3	Requires hydraulic conductivities determined through laboratory methods be confirmed by appropriate field testing.	Applies to the construction of engineered caps at solid waste disposal sites. Relevant and Appropriate to Site 2 if 23 CCR, Div. 3, Ch 15, Article 8 cap later required.	Applicable to Site 4 ⁴ Relevant and Appropriate to Site 3
Porter-Cologne Water Quality Control Act (California Water Code Sections 13140-13147, 13172, 13260, 13263, 13267, 13304)	Title 23, CCR, Section 2541(d) ²	Applicable to Site 4 Relevant & Appropriate to Site 3	Requires earthen materials used in containment structures consist of a mixture of clay and other suitable fine-grained soils which have specified characteristics, and which can be compacted to attain the required permeability when installed.	Applies to discharges of waste to solid waste disposal sites. Relevant and Appropriate to Site 2 if 23 CCR, Div. 3, Ch 15, Article 8 cap later required.	Applicable to Site 4 ⁴ Relevant and Appropriate to Site 3
Porter-Cologne Water Quality Control Act (California Water Code Sections 13140-13147, 13172, 13260, 13263, 13267, 13304)	Title 23, CCR, Section 2546(a) & 2546(c) to (f) ²	Applicable to Site 4 Relevant & Appropriate to Sites 2 and 3	Requires management of precipitation and drainage control	Applies to all areas at which waste has been discharged to land.	Applicable to Site 4 ⁴ Relevant and Appropriate to Sites 2, 3

Table 2.43 Mather AFB Landfill Operable Unit State ARARs¹

Source	Standard, Requirement, Criterion, or Limitation	ARAR Status	Description	Comment	Associated Site(s)
Porter-Cologne Water Quality Control Act (California Water Code Sections 13140-13147, 13172, 13260, 13263, 13267, 13304)	Title 23, CCR, Article 5	Relevant and Appropriate	May require water quality monitoring and response programs for waste management units.	Applies to solid waste disposal sites.	2, 3, and 4
Porter-Cologne Water Quality Control Act (California Water Code Sections 13140-13147, 13172, 13260, 13263, 13267, 13304)	Title 23, CCR, Section 2580(a) ²	Applicable, Site 4 Relevant & Appropriate, Sites 2, 3	Requires maintenance of waste contaminant facilities and precipitation and drainage controls, and contaminated groundwater monitoring throughout the post-closure maintenance period. The post-closure maintenance period will extend as long as wastes pose a threat to water quality.	Applies to the closure and post-closure maintenance of solid waste disposal sites.	Applicable to Site 4 ⁴ Relevant and Appropriate to Sites 2, 3
Porter-Cologne Water Quality Control Act (California Water Code Sections 13140-13147, 13172, 13260, 13263, 13267, 13304)	Title 23, CCR, Section 2580(d) ²	Applicable, Site 4 Relevant & Appropriate, Sites 2, 3	Requires that closed landfills be provided with at least two permanent monuments installed from which the location and elevation of wastes, contaminant structures, and monitoring facilities can be determined throughout the post-closure maintenance period.	Applies to closing solid waste disposal sites.	Applicable to Site 4 ⁴ Relevant and Appropriate to Sites 2, 3
Porter-Cologne Water Quality Control Act (California Water Code Sections 13140-13147, 13172, 13260, 13263, 13267, 13304)	Title 23, CCR, Section 2580(e) ²	Applicable, Site 4 Relevant & Appropriate, Sites 2, 3	Requires that vegetation for closed waste management units be selected to require minimum irrigation and maintenance, and not impair the integrity of containment structures including the final cover.	Applies to the closure of solid waste disposal sites and other areas where wastes have been discharged to land.	Applicable to Site 4 ⁴ Relevant and Appropriate to Sites 2, 3

Table 2.43 Mather AFB Landfill Operable Unit State ARARs¹

Source	Standard, Requirement, Criterion, or Limitation	ARAR Status	Description	Comment	Associated Site(s)
Porter-Cologne Water Quality Control Act (California Water Code Sections 13140-13147, 13172, 13260, 13263, 13267, 13304)	Title 23, CCR, Section 2581 ²	Applicable to Site 4 Relevant & Appropriate to Site 3	Requires a final cover constructed in accordance with specific prescriptive standards, to be maintained as long as wastes pose a threat to water quality.	If water quality is threatened, this section is relevant and appropriate for wastes contained or left in place at the end of remedial actions that could affect water quality. Includes closure of landfills and other areas where wastes have been discharged to land. Would be relevant and appropriate to Site 2 if a 23 CCR, Div. 3, Ch. 15, Art. 8 cap were later required.	Applicable to Site 4 ⁴ Relevant and Appropriate to Site 3
Porter-Cologne Water Quality Control Act (California Water Code Sections 13140-13147, 13172, 13260, 13263, 13267, 13304)	Title 23, CCR, Section 2596(b) ²	Applicable to Site 4	Procedures related to routine operations and emergency conditions must be developed for the waste disposal activities.	Applies to existing solid waste disposal sites.	Applicable to Site 4 ⁴
Porter-Cologne Water Quality Control Act (California Water Code Sections 13140-13147, 13172, 13260, 13263, 13267, 13304)	Title 23, CCR, Section 2597 ²	applicable to Site 4 Relevant & Appropriate to Sites 2, 3	Procedures for closure and post-closure maintenance must be developed. The magnitude of settlement due to waste decomposition and compaction and subsidence of the underlying natural geological materials must be estimated. If the post-closure use is not non-irrigated open space, the water balance for the site must be estimated and adverse impacts on the final cover anticipated.	Applies to closing solid waste disposal sites.	Applicable to Site 4 ⁴ Relevant and Appropriate to Sites 2, 3
Sacramento Metropolitan Air Quality Management District	Rule 202, New Source Review	Applicable	Requires that any new source meet emission limitations for criteria air pollutants. The Sacramento area is a nonattainment area for ozone, carbon monoxide, and particulate matter.	Applies to any new emissions unit or modification to an existing emissions unit which results in an increase in daily ROC emissions	2, 3, & 4

Table 2.43 Mather AFB Landfill Operable Unit State ARARs¹

Source	Standard, Requirement, Criterion, or Limitation	ARAR Status	Description	Comment	Associated Site(s)
Sacramento Metropolitan Air Quality Management District	Rule 202, Section 301, Best Available Technology	Applicable	Requires the application of Best Available Control Technology	Applies to any new emissions unit or modification to an existing emissions unit which results in an increase in daily ROC emissions SMAQMD determined that the passive venting of landfill gases is BACT for sites 2, 3, & 4	2, 3, & 4
Sacramento Metropolitan Air Quality Management District	Rule 402, Nuisance Standard	Applicable	Limits emissions of odors and other nuisance material to the air		2, 3, 4, 5, & 6
Sacramento Metropolitan Air Quality Management District	Rule 403, Fugitive Dusts	Applicable	Limits visible particulate emissions to the property line		2, 3, 4, 5, & 6
Hazardous Waste Control Law (HWCL) ²	Title 22. Social Security, (22 CCR) Division 4.5. Environmental Health Standards for the Management of Hazardous Wastes, Chapter 11., Identification and Listing of Hazardous Waste, Article 1. General.	Applicable	Article 1 identifies those wastes which are subject to regulation as hazardous wastes under this division and which are subject to the notification requirements of Health and Safety Code section 25153.6. Article 1 defines the terms "waste" and "hazardous waste", identifies those wastes which are excluded from regulation under this division, and establishes special management requirements for hazardous waste which is recycled and establishes rules for classifying and managing contaminated containers.	The wastes excavated from Sites 5 & 6 must be classified using either generator knowledge or waste analysis	Waste from Sites 5 and 6
HWCL	22 CCR., Division 4.5., Chapter 11., Article 2. Criteria for Identifying the Characteristics of Hazardous Waste.	Applicable	Article 2 sets forth the criteria to identify characteristics of hazardous waste.		Waste from Sites 5 and 6

Table 2.43 Mather AFB Landfill Operable Unit State ARARs¹

Source	Standard, Requirement, Criterion, or Limitation	ARAR Status	Description	Comment	Associated Site(s)
HWCL	22 CCR., Division 4.5., Chapter 11., Article 3. Characteristics of Hazardous Waste.	Applicable	Article 3 identifies characteristics of hazardous waste.		Waste from Sites 5 and 6
HWCL	22 CCR., Division 4.5., Chapter 11., Article 4. Lists of RCRA Hazardous Wastes.	Applicable	Article 4 lists particular hazardous wastes.		Waste from Sites 5 and 6
HWCL	22 CCR., Division 4.5., Chapter 11., Article 5. Categories of Hazardous Waste.	Applicable	Article 5 identifies categories of hazardous waste including RCRA hazardous waste, non-RCRA hazardous waste, extremely hazardous waste, and special waste, and establishes criteria and management standards for special waste and extremely hazardous waste.		Waste from Sites 5 and 6
HWCL	22 CCR., Division 4.5., Chapter 12. Standards Applicable to Generators of Hazardous Waste Article 1. Applicability.	Applicable	Article 1 establishes standards for generators of hazardous waste located in California.	Only applicable if the wastes from Site 5 & 6 are classified as hazardous or non-RCRA hazardous waste	Waste from Sites 5 and 6
HWCL	22 CCR., Division 4.5., Chapter 14., Article 1. General.	Applicable	Article 1 establishes minimum standards which define the acceptable management of hazardous waste.	Only applicable if the wastes from Site 5 & 6 are classified as hazardous waste.	Waste from Sites 5 and 6

Table 2.43 Mather AFB Landfill Operable Unit State ARARs¹

Source	Standard, Requirement, Criterion, or Limitation	ARAR Status	Description	Comment	Associated Site(s)
HWCL	22 CCR., Division 4.5., Chapter 14., Article 2. General Facility Standards.	Applicable	Article 2 requires that before any hazardous waste is transferred, treated, stored, or disposed of a detailed chemical and physical analysis of a representative sample of the waste will be obtained. Furthermore, it requires security to prevent the unknowing entry, and minimize the possibility for the unauthorized entry, or persons or livestock onto the area of hazardous waste storage. The inspection of the hazardous waste storage facility for malfunctions and deterioration, operator errors, and discharges is required.	Only applicable if wastes from Sites 5 & 6 are classified as hazardous	Waste from Sites 5 and 6
HWCL	22 CCR., Division 4.5., Chapter 14., Article 3. Preparedness and Prevention.	Applicable	Article 3 requires the proper design, operation, equipment procurement, for hazardous storage facilities.	Only applicable if wastes from Sites 5 & 6 are classified as hazardous	Waste from Sites 5 and 6
HWCL	22 CCR., Division 4.5., Chapter 14., Article 4. Contingency Plan and Emergency Procedures.	Applicable	Article 4 requires the development of a contingency and emergency procedures planning.	Only applicable if wastes from Sites 5 & 6 are classified as hazardous	Waste from Sites 5 and 6
HWCL	22 CCR., Division 4.5., Chapter 14., Article 7. Closure and Post-Closure.	Applicable	Article 7 requires that the hazardous waste storage facility shall minimize the need for further maintenance; and controls, minimizes or eliminates, to the extent necessary to protect human health and the environment, post-closure capture of hazardous waste, hazardous constituents, leachate, contaminated rainfall or runoff, or waste decomposition products to the ground or surface waters or to the atmosphere.	Only applicable if wastes from Sites 5 & 6 are classified as hazardous	Waste from Sites 5 and 6
HWCL	22 CCR., Division 4.5., Chapter 14., Article 9. Use and Management of Containers.	Applicable	Article 9 requires the proper management of hazardous waste containers.	Only applicable if wastes from Sites 5 & 6 are classified as hazardous and stored in containers maintained on-site.	Waste from Sites 5 and 6
HWCL	22 CCR., Division 4.5., Chapter 14., Article 11. Surface Impoundments.	Applicable	Article 11 applies to the management of Surface Impoundments for hazardous waste.	Only applicable if wastes from Sites 5 & 6 are classified as hazardous and are managed in a surface impoundment	Waste from Sites 5 and 6

Table 2.43 Mather AFB Landfill Operable Unit State ARARs¹

Source	Standard, Requirement, Criterion, or Limitation	ARAR Status	Description	Comment	Associated Site(s)
HWCL	22 CCR., Division 4.5., Chapter 14., Article 12. Waste Piles.	Applicable	Article 12 applies to the management of Waste Piles.	Only applicable if wastes from Sites 5 & 6 are classified as hazardous and are managed in waste piles	Waste from Sites 5 and 6
HWCL	22 CCR., Division 4.5., Chapter 14., Article 15.5. Correction Action for Waste Management Units	Applicable	Article 15.5 allows for the designation of an area at a facility as a corrective action management unit (CAMU).	This provision would allow for the consolidation and/or management of hazardous wastes from Sites 5 and 6 at an onsite, land-based storage or treatment unit without triggering land disposal restrictions.	Waste from Sites 5 and 6
HWCL	22 CCR., Division 4.5., Chapter 18., Article 1. General.	Applicable	Article 1 provides the purpose, scope, and applicability of Land Disposal Restrictions.	Only applicable if wastes from Sites 5 & 6 are classified as hazardous and are disposed or treated in an area not designated as a CAMU	Waste from Sites 5 and 6
HWCL	22 CCR., Division 4.5., Chapter 18., Article 2. Schedule for Land Disposal Prohibition and Establishment of Treatment Standards.	Applicable	Article 2 provides a list of wastes subject to landfill disposal restrictions.	Only applicable if wastes from Sites 5 & 6 are classified as hazardous and are disposed or treated in an area not designated as a CAMU	Waste from Sites 5 and 6
HWCL	22 CCR., Division 4.5., Chapter 18., Article 3. Prohibitions on Land Disposal.	Applicable	Article 3 provides waste specific land disposal prohibitions for Solvent Wastes, Dioxin-containing Wastes, and California Listed Wastes.	Only applicable if wastes from Sites 5 & 6 are classified as hazardous and are disposed or treated in an area not designated as a CAMU	Waste from Sites 5 and 6
HWCL	22 CCR., Division 4.5., Chapter 18., Article 4. Treatment Standards.	Applicable	Article 4 provides treatment standards expressed as concentrations in Waste Extract, Specified Technologies, and Waste Concentrations.	Only applicable if wastes from Sites 5 & 6 are classified as hazardous	Waste from Sites 5 and 6

Table 2.43 Mather AFB Landfill Operable Unit State ARARs¹

Source	Standard, Requirement, Criterion, or Limitation	ARAR Status	Description	Comment	Associated Site(s)
HWCL	22 CCR., Division 4.5., Chapter 18., Article 5. Prohibitions on Storage.	Applicable	Article 5 provides prohibitions on storage of Restricted Wastes.	Only applicable if wastes from Sites 5 & 6 are classified as hazardous	Waste from Sites 5 and 6
Fish & Game Code Section 1600 et seq.		Applicable	Work within the 100-year flood plain, consisting of but not limited to diversion or obstruction of the natural flow or changes in the channel, bed, or bank of any river, stream, or lake will involve mitigation measures to avoid or minimize impacts on natural resources.	Site 5 is located within the 100-year floodplain of an unnamed tributary of Morrison Creek. Site 4 may be located within a 100-year floodplain of unnamed tributary of Morrison Creek	4 & 5
Fish & Game Code Sections 5650 & 5652		Applicable	It is unlawful to deposit in, permit to pass into, or place where it can pass into the waters of this state any material listed in Fish & Game Code Section 5650 & 5652.	Site 5 is located within the 100-year floodplain of an unnamed tributary of Morrison Creek. Site 4 may be located within a 100-year floodplain of unnamed tributary of Morrison Creek	4 & 5

CCR - California Code of Regulations

U.S. EPA - United States Environmental Protection Agency

CFR - Code of Federal Regulations

RD/RA - remedial design/remedial action

ARAR - applicable or relevant and appropriate requirement

ROD - Record of Decision

RWQCB - Regional Water Quality Control Board

CAMU - Corrective Action Management Unit

2.8.2.2 *Applicability of California Code of Regulations Title 23, Chapter 15*

The U.S. EPA believes that Title 23 (Waters), Division 3 (State Water Resources Control Board), Chapter 15 (Discharge of Waste to Land) has limited applicability to those remedial actions. The Air Force concurs with this interpretation. Pursuant to Section 2511(d) of Chapter 15, remedial actions undertaken by or at the direction of public agencies are exempt from the provisions of Chapter 15, with two exceptions: 1) waste that is removed from the immediate place of release shall be discharged according to Article 2 of Chapter 15; and 2) waste that is contained at the place of release shall implement applicable provisions of Chapter 15 to the extent feasible.

Applying this exemption in Section 2511(d) to the remedial actions at the landfills, since the waste at Sites 2, 3, and 4 are being contained at the place of release, the second exception to the general exemption requires the Air Force to implement the applicable provisions of Chapter 15 to the extent feasible in its remedial actions for these three landfills. Because these three landfills are closed, abandoned, or inactive landfills, the only applicable provision of Chapter 15 to these landfills is Section 2510(g). Since the waste at Sites 5 and 6 are being removed from the place of release, the first exception to the general exemption in Section 2511(d) requires that Air Force to discharge the waste being removed from these two landfills in accordance with Article 2 of Chapter 15.

However, U.S. EPA also believes that Chapter 15 has special applicability to Site 4 under the State's Subtitle D program (Section 4005 of the Solid Waste Disposal Act, as amended by the Resource Conservation and Recovery Act of 1976). Since the Air Force has decided to consolidate wastes from Sites 5 and 6 into Site 4, the landfill at Site 4 now becomes a municipal solid waste landfill ("MSWLF") subject to the federal and State Subtitle D regulations, with the State requirements becoming ARARs only if they are more stringent than the federal requirements. The State's Subtitle D Program, approved by U.S. EPA on February 1, 1993, includes the State Water Resources Control Board's regulations in Chapter 15 and the Integrated Waste Management Board's regulations in Title 14, as amended on April 19, 1994.

The State disagrees with portions of U.S. EPA's position. The State believes that the consolidation of wastes from Sites 5 and 6 into Site 4 constitutes a new discharge of waste to land, which is subject to the Chapter 15 regulations independent of Subtitle D. In accordance with Section 2511(d), the wastes must be discharged according to Article 2 of

Chapter 15. Article 3 provides that the discharge of nonhazardous solid wastes shall be permitted only at waste management units that meet Chapter 15 requirements.

The State believes that, pursuant to Section 2510(g), Sites 2, 3, 5, and 6 must be monitored in accordance with Article 5. If there is a threat to water quality, Article 5 corrective action is also applicable. Article 8 closure requirements would then be relevant and appropriate.

The State also believes that Chapter 15 applies to any wastes remaining in place at Sites 5 and 6 after the excavation actions. It may be necessary to contain the remaining wastes to prevent impacts to waters of the state. Actions to contain the wastes must implement applicable provisions of Chapter 15 to the extent feasible.

The U.S. EPA and the State have agreed to disagree on the applicability of Chapter 15 to these landfills. Notwithstanding this disagreement on the applicability of Chapter 15, U.S. EPA believes that there are substantive requirements in Chapter 15 that the Air Force must comply with in these remedial actions, either because of the exception to the general exemption in Section 2511(d), or because of the special applicability of Chapter 15 under the State's Subtitle D regulations to Site 4, or, in the case of the landfills at Sites 2, 3, 5 and 6, because EPA concludes that these Chapter 15 requirements are relevant and appropriate. These substantive requirements are identified in the Table 2.43.

2.8.2.3 *Chemical-Specific ARARs for Soils*

Chemicals of potential concern were identified primarily from the chemical characterizations of the surface and subsurface fill materials and an evaluation of the potential for each contaminant to impact groundwater. Table 2.26 summarizes the COPCs for the landfill sites. Chemical-specific ARARs and TBCs for these constituents have been identified for both soil and water and are described below.

2.8.2.1.2 *Chemical-Specific ARARs and TBCs for Soil*

There are currently no chemical-specific ARARs identified for the site soils. The cleanup levels proposed by the U.S. EPA proposed for soils under the Corrective Action for Solid Waste Management Units at Hazardous Waste Management Facilities in 1990 [55 Federal Register (FR) 30798-30884] were considered as potential TBCs. While these proposed cleanup levels are not ARARs, since they have not been promulgated, they were evaluated as potential TBCs. The proposed cleanup levels are relevant but not appropriate since they are for the management of hazardous waste. The fill materials at the landfills are not hazardous

wastes under the Resource Conservation and Recovery Act or Hazardous Waste Control Act. Also, the methodology in the proposed rule uses several exposure assumptions that do not accurately describe the situations at the Mather AFB landfills. Consequently, the proposed regulation was considered inappropriate.

Soil levels of chemicals developed using the DLM guideline [CVRWQCB 1989] have been identified as TBCs for establishing cleanup levels or evaluating the ability of an alternative to protect groundwater quality by changing the leachability of the fill materials. The DLM-derived TBC values for each site are provided in Tables 2.14 to 2.18. If contaminants are identified in soil beneath sites 5 and 6, a Water Quality Assessment will be conducted using the DLM and V-LEACH, depending on the constituent, or other equivalent appropriate method to determine whether the soil contaminant poses a threat to groundwater quality.

2.8.2.1.2 Chemical-Specific ARARs and TBCs for Water

Because the groundwater beneath the landfills will be addressed in the Mather AFB Soil and Groundwater Operable Unit ROD, it is not necessary to address ARARs for groundwater in this ROD. However, because the landfills have the potential to impact groundwater quality, chemical-specific ARARs and TCBs for water have been considered in the evaluation of the alternatives. Specifically, each alternative was evaluated for its ability to either reduce the soil concentrations or leachability of the COPCs, such that leachate formed from the waste material will not result in the concentrations of COPCs in the groundwater exceeding ARARs. The DLM guideline [CVRWQCB 1989] was the TBC methodology utilized to assess the ability of each alternative to protect groundwater quality.

The regulatory framework associated with cleanup at the landfill is driven in part by the potential use of the local groundwater. Drinking water is considered to be the highest beneficial use and remediation to drinking water standards or prevention of degradation of water beyond drinking water use affords the greatest level of protection and cleanup. As required by the California Porter-Cologne Water Quality Act, the Regional Water Quality Control Board-Central Valley Region defines the beneficial uses of various water bodies for the Sacramento River Basin. Water bodies and their beneficial uses are presented in the Central Valley Basin Plan. The Basin Plan classifies aquifers in the Mather AFB area to have, "existing or potential beneficial uses as sources of drinking water."

Groundwater beneath the landfill sites is a potential source of drinking water. Consequently, the following have been identified as ARARs for remedial actions at the landfill sites, which include groundwater monitoring,:

- U.S. Primary MCLs [40 CFR Part 141];
- California State Primary MCLs [22 California Code of Regulations 64435]; and
- California State Secondary MCLs [22 CCR 64473].

The water quality goals for each contaminant of concern at the landfill sites are provided in Table 2.44.

If more than one potential standard or criterion was established for a single chemical, the most stringent generally was identified as the ARAR. Compliance with Resolution 68-16 requires that the quality of the underlying groundwater must be maintained following implementation of the selected remedies for the landfills. Water is not extracted from the aquifers directly below the landfills, and groundwater beneath the landfills will be addressed as part of the Mather AFB Soil and Groundwater OU ROD, as noted above.

Table 2.44 Water Quality Standards

Constituent	Concentration ($\mu\text{g}/\ell$)		
	Relevant and Appropriate Requirements		
	U.S. Primary MCL	Calif. Primary MCL	Calif. Secondary MCL
Antimony	6	--	--
Arsenic	50	--	--
Barium	--	1000	--
Lead	15	--	--
Manganese	--	--	50

$\mu\text{g}/\ell$ = microgram per liter

MCL = maximum contaminant level

summarized from the CVRWQCBs Water Quality Goals [CVRWQCB 1993]

2.8.2.4 *Location-Specific ARARs*

For each of the landfills, the site and the surrounding area (i.e., within 0.25 mile of the landfill perimeter) were reviewed to identify and locate special features. Only floodplains and wetlands occur at or near the landfill sites.

Based on review and extrapolations of Federal Emergency Management Agency (FEMA) flood insurance rate maps for Sacramento County, California [FEMA 1989] and floodplain calculations performed by the U.S. Army Corp of Engineers, it is believed that portions of Sites 4 and 5 may be within the 100-year floodplain of Morrison Creek and its tributaries. The California Department of Fish and Game (DFG) regulations [14 CCR 1600] establish applicable requirements for any construction work within 100-year floodplains for the protection and continuance of fish or wildlife resources.

Vernal pools are classified as wetlands under U.S. Army Corps of Engineers criteria. A large vernal pool occurs about midway between Site 3 and Site 4, three small vernal pools are known to occur near the western side of Site 4 [IT 1993c], and seasonal ponding occurs north of the southern landfill at Site 6. As of December 1992 there has been no obvious signs of disturbance or stress of the vernal pools or areas of ponding near Sites 3, 4, and 6 [IT 1993c]. The U.S. EPA regulations (40 CFR 230.10(a) to 230.10 (c)) and U.S. Army Corps of Engineers regulations (33 CFR 330 and its associated Appendix) promulgated under Section 404 of the Clean Water Act [33 USC Section 1344] are location-specific ARARs for Sites 3, 4, and 6 due to the nearby vernal pools. These regulations require that impacts to an existing wetland from a contaminated site and potential impacts from a remediation project be considered and any adverse impacts be minimized to the extent possible. For a remedial action, the potential for degradation or destruction of a functioning wetland needs to be considered. Activities that might come under this provision include diversion of either surface or groundwater from or into a wetland, silting of a wetland, and construction of roads or other facilities within the wetland, removing vegetation where the root system seriously disturbs the substrate, and any excavation, including dredging that is designed to minimized spillage of dredged material. The substantive requirements of 33 CFR 330 for construction work in wetlands are: use of erosion and siltation controls, heavy construction equipment working in wetlands must be placed on mats or other measures must be taken to minimize soil disturbances, and activity must jeopardize the continual existence of an no endangered or threatened species. Executive Order 11990 is location-specific TBC guidance. The Executive Order requires federal agencies to limit adverse impacts to wetland areas, both

in the short and long term, by avoidance of "direct or indirect support of new construction in wetlands whenever there is a practicable alternative."

2.8.2.5 *Action-Specific ARARs*

Action-specific ARARs are technology-based or activity-based requirements or limitations on actions taken with respect to the waste. For the landfills, the major governing action-specific ARARs are those regulations and guidelines developed for the operation and closure of MSWLFs.

At the Federal level, MSWLFs are regulated under Subtitle D of the Resource Conservation and Recovery Act. The Subtitle D regulations are found at Title 40, Part 258 of the CFR. Under Subtitle D, states were required to adopt solid waste permit programs that met the Federal requirements. Within California, the MSWLF regulations are found in Chapter 15, Division 3, Title 23 of the CCR and Chapter 3, Division 7, Title 14 of the CCR. The California State program has been approved by U.S. EPA, but it is not authorized: that is, U.S. EPA has not permitted the state to administer and enforce Subtitle D in lieu of the Federal regulations. The Federal regulations are applicable to any MSWLF that accepts household waste. However, within approved states, such as California, the state regulations may be enforced in addition to the Federal Subtitle D regulations.

Specific provisions of the Federal Subtitle D and state MSWLF regulations have been identified as either applicable or relevant and appropriate for the remediation activities at the landfills. When specific state and Federal MSWLF regulations are the same, the Federal regulation is the ARAR. If the State and Federal standards address the same issue but are not identical, the most stringent requirement is the ARAR. For the Landfill OU, the determination of whether the State MSWLF requirement is more stringent than the federal MSWLF requirement has been deferred to the remedial design phase. The Federal and State requirements are not always directly comparable and sufficient information is not available to determine the stringency of the differing requirements. Tables 2.42 and 2.43 list both the State and Federal MSWLF regulations and a summary of requirements.

Resource Conservation and Recovery Act Subtitle D is applicable only to sites that accept municipal solid wastes after October 1993. Site 4 will be receiving waste from sites 5 and 6 after October 9, 1993. The wastes from sites 5 and 6 are expected to be comparable to municipal solid waste. Consequently, the provisions of Subtitle D (federal or state requirements, whichever are more stringent) are applicable to Site 4.

Disposal Site Operation regulations [14 CCR, Division 7, Chapter 3, Article 7.5] and Federal Subtitle D operating criteria [40 CFR 258.20 to 40 CFR 258.28] have been identified as action-specific ARARs. These regulations define appropriate parameters for the following:

- confined unloading;
- spreading and compaction;
- slopes and cut angles;
- stockpiling;
- availability of cover material;
- daily covers;
- liquid restrictions;
- runoff/runoff controls;
- surface water requirements;
- access requirements;
- air emissions;
- explosive gas controls;
- disease vector controls; and
- exclusion of hazardous waste.

In addition, Disposal Site Control regulations [14 CCR, Division 3, Chapter 3, Article 7.6] are considered applicable to Site 4 and relevant and appropriate to sites 5 and 6. These include requirements for controlling:

- nuisances;
- fire;
- leachate;
- landfill gases;
- dust;
- drainage and erosion; and
- waste contact with water, litter, noise, odor, traffic, and ponding water.

Based on disposal histories and remedial investigation results, the wastes at Sites 5 and 6 are not expected to be hazardous. However, the potential to excavate hazardous wastes from these landfills can not be excluded. If hazardous wastes are found, portions of the DTSC regulations governing the generation (22 CCR 66261) and transfer, treatment, storage, and disposal of hazardous wastes (22 CCR 66264) would be applicable to onsite activities. Any suspected waste would be classified based on the characteristics of hazardous waste (22 CCR 66261) (and also as designated waste under 23 CCR 2522). Any hazardous waste managed on site needs to be handled according to the substantive requirements, including:

- packaging prior to transport (22 CCR 66262.30);
- labeling prior to transport (22 CCR 66262.31); and
- marking prior to transport (22 CCR 66262.32).

Federal regulations that implement the Solid Waste Disposal Act (SWDA) Subtitle D [40 CFR Part 258.60 to 258.61], and State regulations governing closure and post-closure of solid waste disposal sites promulgated by the California Integrated Waste Management Board [14 CCR Division 7, Chapter 3, Article 7.8] were identified as applicable to Site 4 and relevant and appropriate to sites 2 and 3. The State Water Resources Control Board (SWRCB) regulations found at 23 CCR Division 3, Chapter 15, regulations are considered applicable to Site 4 and relevant and appropriate to sites 2 and 3. These regulation are:

- 23 CCR 2546 (a) for final drainage;
- 23 CCR 2546 (c) for run-off controls;
- 23 CCR 2546 (d) for collection and holding of surface water drainage;
- 23 CCR 2558 for groundwater monitoring;
- 23 CCR 2580 (d) for final grading;
- 23 CCR 2581 (a) for final cover design criteria;
- 23 CCR 2596 (b) for an elevation survey.

Substantive Solid Waste Disposal Act Subtitle D closure and post-closure care requirements include:

- designing and installing a final cover system that minimizes infiltration and erosion;
- providing an estimate of the largest area of the landfill requiring a final cover;
- providing an estimate of the maximum inventory of wastes ever onsite over the active life of the facility;
- developing a closure schedule;
- complying with substantive requirements for obtaining certification of closure;
- recording a notation on the deed to the landfill property to notify the any potential purchasers that the site was used for landfilling; and
- conducting post-closure care for the length of time sufficient to protect human health and the environment, including: maintaining the integrity of the final cover, maintaining and operating the leachate collection system (if applicable); monitoring the groundwater; and maintaining and operating the gas monitoring system.

State Water Resources Control Board regulations established criteria for closure and post-closure care of landfill facilities [23 CCR, Division 3, Chapter 15, Article 8]. The action-specific requirements address the following:

- waste containment;
- precipitation and drainage controls;
- final cover construction;
- grading requirements; and
- protection and maintenance of surveyed monuments.

Additional requirements establish groundwater and vadose zone monitoring requirements for the post-closure period [23 CCR, Division 3, Chapter 15, Article 5].

The IWMB requirements for closure [14 CCR, Division 3, Chapter 3, Article 7.8] address:

- development of an emergency response plan;
- security of the landfill site;
- final cover, grading, site face and drainage designs;
- slope protection and erosion control;
- leachate control;
- groundwater monitoring and perimeter monitoring networks;
- landfill gas monitoring and control; and
- structural monitoring.

The IWMB requirements for closure include restrictions on the concentration of methane in air, i.e., 5 percent by volume, that is allowed at the facility property boundary [14 CCR, Division 3, Chapter 3, Article 7.8, Section 17783 (2)]. They also require control of trace gasses to prevent chronic exposure to toxic and/or carcinogenic compounds [14 CCR, Division 3, Chapter 3, Article 7.8, Section 17783 (3)].

The following SMAQMD requirements are ARARs for the covering and removal/consolidation alternatives:

- Rule 403 - Fugitive Dusts: Limits visible particulate emissions at the property line.
- Rule 202 - New Source Review: Requires that any new source meet emission limitations for criteria air pollutants, including use of Best Available Control Technology (BACT) to any new emissions unit. The SMAQMD has

determined that no controls is BACT for passive gas venting at site 2, 3, and 4.

- Rule 402 - Nuisance Standard: Limits emissions of odors and other nuisance material to the air.

The State has asserted that State Water Resources Control Board Resolution 92-49, specifically Paragraphs III F and III G, is an applicable requirement for all of the proposed remedial actions. No determination is made in this document that Resolution 92-49 is an ARAR for the selected remedial actions. However, the State has determined that the substantive requirements of Resolution No. 92-49 are being met by the remedial actions. Therefore, the State has decided not to dispute the ROD on these grounds.

A number of regulatory requirements in Title 14, CCR, Division 7, Chapter 3, Article 7.5 (Disposal Site Operations) were not considered ARARs because they do not directly address protection of public health and the environment, but rather address worker health and safety or good work and management practices. However, the landfill sites will be remediated under approved health and safety plans to ensure that work is accomplished according to applicable health and safety requirements. In addition, the work will be planned and conducted to meet the ARARs identified for the remedial actions, incorporating these practices as appropriate. The requirements in these categories contained in the Title 14 regulations that were not considered ARARs include:

- Sanitary Facilities: Adequate sanitary facilities for site personnel shall be available on-site or in the immediate vicinity
- Water Supply: Safe and adequate drinking water shall be available for site personnel
- Communications Facilities: Communications facilities will be available to site personnel to allow quick response to emergencies
- Lighting: Lighting will be used for operations conducted during hours of darkness
- Personnel Health and Safety: Operating and maintenance personnel shall be required to wear and use approved safety equipment

- Availability: Adequate staffing will be provided by operator to deal effectively and promptly with operations, maintenance, environmental controls, emergencies, and health and safety
- Training: Personnel assigned to the site will be adequately trained.
- Supervision: Adequate supervision of site operations will be provided, as well as notification to authorities of responsible operator, station manager, and supervisor
- General: Equipment will be adequate in type, capacity, number and maintained in order to consistently perform work to comply with regulatory standards
- Standby Equipment: Standby equipment is not required providing a source of replacement equipment is maintained adequately.
- General: Preventative maintenance procedures and programs for equipment and site facilities will be developed and used for operating and completed sites.
- Traffic Control: Traffic will be managed to minimize traffic safety problems on adjacent public roads.

Several of the California regulations require certification by a professional geologist or engineer, registered or certified by the State of California. These portions of the regulations are considered procedural rather than substantive requirements. However, to the degree that federal contractors perform and/or supervise the engineering and geotechnical work, they will be certified professionals or under the supervision of certified professionals as appropriate.

2.8.2.6 Site 1 - Runway Overrun Landfill

Alternative 1.1 is the only alternative developed for this site. No refuse or contaminants were found during remedial activities. Therefore, no comparative analysis is necessary.

2.8.2.7 Site 2 - "8150" Area Landfill

Both Alternatives 2.2 and 2.3 would meet ARARs in approximately the same timeframe.

2.8.2.8 *Site 3 - Northeast Perimeter Landfill No. 1*

Alternatives 3.2 and 3.3 would meet ARAR requirements in approximately the same timeframe.

2.8.2.9 *Site 4 - Northeast Perimeter Landfill No. 2*

Alternatives 4.2 and 4.3 both meet ARAR requirements in approximately the same timeframe.

2.8.2.10 Site 5 - Northeast Perimeter Landfill No. 3

Alternatives 5.2 and 5.3 would both meet ARAR requirements in approximately the same timeframe.

2.8.2.11 Site 6 - Firing Range Landfill Sites

Alternatives 6.2 and 6.3 would both meet ARAR requirements in approximately the same timeframe.

2.8.3 Long-Term Effectiveness and Permanence

Long-term effectiveness and permanence refers to the ability of a remedy to maintain reliable protection of human health and the environment after clean-up goals have been met. The criterion includes the consideration of residual risk and the adequacy and reliability of controls.

2.8.3.1 Site 1 - Runway Overrun Landfill

Alternative 1.1 is the only alternative developed for this site. No refuse or contaminants were found during remedial activities. Therefore, no comparative analysis is necessary.

2.8.3.2 Site 2 - "8150" Area Landfill

Alternative 2.3 is judged to offer a higher level of long-term effectiveness than Alternative 2.2 because all the refuse is removed and the site is clean-closed. Under Alternative 2.2 the refuse would remain in place and be covered with a vegetative cover.

2.8.3.3 Site 3 - Northeast Perimeter Landfill No. 1

Alternative 3.3 is judged to offer a higher level of long-term effectiveness than Alternative 3.2, since all the refuse is removed from Site 3, thereby reducing the volume of solid waste to zero and the site is clean-closed. Under Alternative 3.2 the refuse would remain in place and covered with an engineered cap.

2.8.3.4 Site 4 - Northeast Perimeter Landfill No. 2

Alternatives 4.2 and 4.3 are judged to offer a high level of long-term effectiveness. Under both alternatives, refuse would remain in place and be covered with an engineered cap.

2.8.3.5 Site 5 - Northeast Perimeter Landfill No. 3

Alternative 5.2 is judged to offer a higher level of long-term effectiveness than Alternative 5.3 since all the refuse is removed and the site is clean-closed. Under Alternative 5.3 the refuse remains in place and is covered by an engineered cap.

2.8.3.6 Site 6 - Firing Range Landfill Sites

Alternative 6.3 is judged to offer a higher level of long-term effectiveness than Alternative 6.2 since all the refuse is removed and the site is clean-closed. Solid waste remains in place under Alternatives 6.2 and is covered with a vegetative cover.

2.8.4 Reduction of Toxicity, Mobility, or Volume

Reduction of toxicity, mobility, or volume refers to the preference for a remedy that uses treatment to reduce health hazards, contaminant migration, or quantity of contaminants at the site. Treatment was not used for any of the landfill sites because it was not considered practicable or cost-effective.

2.8.4.1 Site 1 - Runway Overrun Landfill

Alternative 1.1 is the only alternative developed for this site. No refuse or contaminants were found during remedial activities. Therefore, no comparative analysis is necessary.

2.8.4.2 Site 2 - "8150" Area Landfill

Alternative 2.3 is judged to be more effective at this site than Alternative 2.2 since all the refuse is removed from Site 2, thereby reducing the volume of solid waste at Site 2 to zero. The volume of waste at Mather AFB is not reduced, merely consolidated. However, the risk of contaminated exposure is localized. Solid waste is left in place under Alternative 2.2. However, landfill cap infiltration modeling suggests that precipitation infiltration and potential corresponding leachate generation is decreased by up to 85 percent.

2.8.4.3 Site 3 - Northeast Perimeter Landfill No. 1

Alternative 3.3 is judged to be more effective at this site than Alternative 3.2 since all the refuse is removed from Site 3, thereby reducing the volume of solid waste at Site 3 to zero. The volume of waste at Mather AFB is not reduced, merely consolidated. However, the risk of contaminated exposure is localized. All refuse would remain in place under Alternative 3.2. However, landfill cap infiltration modeling shows that precipitation infiltration and corresponding potential leachate generation is decreased by up to 82 percent with installation of an engineered cap.

2.8.4.4 Site 4 - Northeast Perimeter Landfill No. 2

Volumes of solid waste remain the same under both Alternative 4.2 and 4.3. Alternative 4.3 is judged to be more effective than Alternative 4.2 since the landfill area is reduced by approximately 20 percent, which would reduce the corresponding potential for leachate generation. Landfill cap infiltration modeling shows that precipitation infiltration, and corresponding potential leachate generation is decreased by up to 83 percent (Alternative 4.2) and up to 87 percent (Alternative 4.3) with installation of an engineered cap.

2.8.4.5 Site 5 - Northeast Perimeter Landfill No. 3

Alternative 5.2 is judged to be more effective at this site than Alternative 5.3 since the volume of refuse at Site 5 is reduced to zero through excavation. The volume of waste at Mather AFB is not reduced, merely consolidated. However, the risk of contaminated exposure is localized. Alternative 5.3 consolidates refuse from the stream channel to the remaining landfills. No waste reduction is realized; however, the landfill area would be reduced and it will lessen the impact on the stream as well as the potential for leachate generation. Landfill cap infiltration modeling shows that precipitation infiltration, and corresponding potential leachate generation is decreased by up to 83 percent for Alternative 5.3 with installation of an engineered cap.

2.8.4.6 Site 6 - Firing Range Landfill Sites

Alternative 6.3 is judged to be more effective at this site than Alternative 6.2 since the volume of refuse at Site 6 is reduced to zero through excavation. The volume of waste at Mather AFB is not reduced, merely consolidated. However, the risk of contaminated exposure is localized. Solid waste remains in place under Alternative 6.2. However, landfill cap infiltration modeling shows that precipitation infiltration, and corresponding potential leachate generation is decreased by up to 87 percent with installation of a vegetative cover.

2.8.5 Short-Term Effectiveness

Short-term effectiveness refers to the period of time in which the remedy achieves protection, as well as the remedy's potential to create adverse impacts on human health and the environment that may result during the excavation, construction, or implementation period.

2.8.5.1 Site 1 - Runway Overrun Landfill

Alternative 1.1 is the only alternative developed for this site. No refuse or contaminants were found during remedial activities. Therefore, no comparative analysis is necessary.

2.8.5.2 Site 2 - "8150" Area Landfill

Alternatives 2.2 and 2.3 are judged to offer a high degree of short-term effectiveness. No adverse effects to community, workers, or the environment are anticipated. Appropriate health and safety procedures would be developed and implemented to assist in worker protection during construction of a vegetative cover or excavation and consolidation of the refuse.

2.8.5.3 Site 3 - Northeast Perimeter Landfill No. 1

Alternatives 3.2 and 3.3 are judged to offer a high degree of short-term effectiveness and no adverse effects to community, workers, or the environment are anticipated. Appropriate health and safety procedures would be developed and implemented to assist in worker protection to minimize hazards during construction of an engineered cap or excavation and consolidation of the refuse.

2.8.5.4 Site 4 - Northeast Perimeter Landfill No. 2

Alternatives 4.2 and 4.3 are judged to offer a high degree of short-term effectiveness and no adverse effects to community, workers, or the environment are anticipated. Appropriate health and safety procedures would be developed and implemented to assist in worker protection during construction of an engineered cap or excavation and consolidation of the refuse. Potential impacts to the stream channel at the eastern border of the landfill are anticipated to be minimal.

2.8.5.5 Site 5 - Northeast Perimeter Landfill No. 3

Alternatives 5.2 and 5.3 are judged to offer a high degree of short-term effectiveness and no adverse effects to community, workers, or the environment are anticipated. Appropriate health and safety procedures would be developed and implemented to assist in worker protection during construction of an engineered cap or excavation and consolidation of the refuse. Potential impacts to the stream channel, due to excavation are anticipated to be minimal.

2.8.5.6 Site 6 - Firing Range Landfill Sites

Alternatives 6.2 and 6.3 are judged to offer a high degree of short-term effectiveness and no adverse effects to community, workers, or the environment are anticipated. Appropriate health and safety procedures would be developed and implemented to assist in worker protection during construction of a vegetative cover or excavation and consolidation of the refuse.

2.8.6 Implementability

Implementability refers to the technical and administrative feasibility of a remedy, including the availability of materials and services needed to implement the selected remedy. It also includes coordination of federal, State, and local governments in cleanup of the site.

2.8.6.1 Site 1 - Runway Overrun Landfill

Alternative 1.1 is the only alternative developed for this site. No refuse or contaminants were found during remedial activities. Therefore, no comparative analysis is necessary.

2.8.6.2 Site 2 - "8150" Area Landfill

Both Alternatives 2.2 and 2.3 are considered to be readily implementable utilizing existing resources and technologies. Buildings and an asphalt road represent potential complications for remedial activities at Site 2. Alternative 2.3 has been judged to be more difficult to implement than Alternative 2.2 based on the premise that removing refuse from near roads and buildings could not be accomplished with great certainty and ease as compared to the construction of a vegetative cover.

2.8.6.3 Site 3 - Northeast Perimeter Landfill No. 1

Alternatives 3.2 and 3.3 are considered to be readily implementable using existing resources and technologies. However, Alternative 3.3 is judged to be more complicated to implement due to potential exposure to contaminants during excavation. Under both alternatives, an existing dirt road would most likely need to be rerouted or replaced.

2.8.6.4 Site 4 - Northeast Perimeter Landfill No. 2

Both Alternatives 4.2 and 4.3 are considered to be readily implementable using existing resources and technologies. Alternative 4.2 offers a higher degree of implementability since it does not introduce the complexities associated with excavation of the refuse as under Alternative 4.3.

2.8.6.5 Site 5 - Northeast Perimeter Landfill No. 3

Alternative 5.3 offers a higher degree of implementability using existing resources and technologies since only the stream channel is excavated (1 percent of refuse and associated soils volume) compared to excavation of the entire site under Alternative 5.2.

2.8.6.6 Site 6 - Firing Range Landfill Sites

Both Alternatives 6.2 and 6.3 are considered to be readily implementable using existing resources and technologies. Alternative 6.2 offers a higher degree of implementability since it does not introduce the complexities associated with excavation (i.e., exposure to contaminants) as under Alternative 6.3.

2.8.7 Cost

This criteria examines the estimated cost for each remedial alternative. For comparison, capital costs and annual operation and maintenance (O&M) costs were used to calculate a present worth cost for each alternative. A detailed cost analysis was performed for each of the alternatives proposed in the FFS Report [IT 1993e]. The present worth cost estimates assume zero equipment salvage value, zero percent inflation, and a five percent discount rate.

2.8.7.1 Site 1 - Runway Overrun Landfill

Alternative 1.1 is the only alternative developed for this site. No refuse or contaminants were found during remedial activities. Therefore, no comparative analysis is necessary.

2.8.7.2 Site 2 - "8150" Area Landfill

The present worth costs to implement Alternatives 2.1, 2.2, and 2.3 are estimated in the Focused Feasibility Study at \$140,718, \$978,213, and \$1,536,068, respectively. Alternative 2.1 includes costs associated with semi-annual groundwater monitoring for 5 years.

Alternative 2.2 includes costs associated with semi-annual groundwater monitoring and quarterly landfill monitoring for at least 5 years. Alternative 2.3 includes costs for quarterly groundwater monitoring for 3 years. Also included in Alternative 2.3 is the prorated cost to accommodate Site 2 refuse and associated soils at the consolidation site (i.e., Site 4).

2.8.7.3 Site 3 - Northeast Perimeter Landfill No. 1

The present worth costs to implement Alternatives 3.1, 3.2, and 3.3 are estimated in the Focused Feasibility Study at \$338,336, \$2,189,438, and \$2,729,088, respectively.

Alternative 3.1 includes costs associated with semi-annual groundwater monitoring for 5 years. Alternative 3.2 includes costs associated with quarterly groundwater monitoring and quarterly landfill monitoring for at least 5 years. Alternative 3.3 includes costs for quarterly groundwater monitoring for at least 3 years. Also included in Alternative 3.3 is the prorated cost to accommodate Site 3 refuse and associated soils at the consolidation site (i.e., Site 4).

2.8.7.4 Site 4 - Northeast Perimeter Landfill No. 2

The present worth costs to implement Alternatives 4.1, 4.2 and 4.3 are estimated in the Focused Feasibility Study at \$288,931, \$2,803,778, and \$3,352,373, respectively.

Alternative 4.1 includes costs associated with semi-annual groundwater monitoring for 5 years. Alternatives 4.2 and 4.3 include costs associated with quarterly groundwater monitoring and quarterly landfill monitoring for at least 5 years.

2.8.7.5 Site 5 - Northeast Perimeter Landfill No. 3

The present worth costs to implement Alternatives 5.1, 5.2 and 5.3 are estimated in the Focused Feasibility Study at \$214,824, \$1,015,793, and \$1,364,542, respectively.

Alternative 5.1 includes costs associated with semi-annual groundwater monitoring for 5 years. Alternative 5.2 includes costs associated with quarterly groundwater monitoring for at least 5 years. Alternatives 5.3 includes costs associated with quarterly groundwater monitoring and quarterly landfill monitoring for at least 5 years. Also included in Alternative 5.2 is the prorated cost to accommodate Site 5 refuse and associated soils at the consolidation site (i.e., Site 4).

2.8.7.6 Site 6 - Firing Range Landfill Sites

The present worth costs to implement Alternatives 6.1, 6.2 and 6.3 are estimated in the Focused Feasibility Study at \$140,718, \$1,048,008, and \$2,361,121, respectively.

Alternative 6.1 includes costs associated with semi-annual groundwater monitoring for 5 years. Alternative 6.2 includes costs associated with semi-annual groundwater monitoring and quarterly landfill monitoring for at least 5 years. Alternatives 6.3 includes costs associated with quarterly groundwater monitoring for 3 years. Also included in Alternative 6.3 is the prorated cost to accommodate Site 6 refuse and associated soils at the consolidation site (i.e., Site 4).

2.8.8 State/Support Agency Acceptance

This indicates whether, based on its review of the RI Report, FFS Report, and Proposed Plan, the State in which the site resides agrees with the preferred alternative. The Air Force, as the lead agency, has involved the State of California Department of Toxic Substances Control, State of California Regional Water Quality Control Board, and the State of California Integrated Waste Management Board.

2.8.8.1 Site 1 - Runway Overrun Landfill

The Air Force has responded to all State regulatory agency comments during their reviews of the FFS Report and the Proposed Plan. The State regulators support the selection of Alternative 1.1 as the preferred remedy.

2.8.8.2 Site 2 - "8150" Area Landfill

The Air Force has responded to all State regulatory agency comments during their reviews of the FFS Report and the Proposed Plan. The State regulators support the selection of Alternative 2.2 as the preferred remedy.

2.8.8.3 Site 3 - Northeast Perimeter Landfill No. 1

The Air Force has responded to all State regulatory agency comments during their reviews of the FFS Report and the Proposed Plan. The State regulators support the selection of Alternative 3.2 as the preferred remedy.

2.8.8.4 Site 4 - Northeast Perimeter Landfill No. 2

The Air Force has responded to all State regulatory agency comments during their reviews of the FFS Report and the Proposed Plan. The State regulators support the selection of Alternative 4.2 as the preferred remedy.

2.8.8.5 Site 5 - Northeast Perimeter Landfill No. 3

The Air Force has responded to all State regulatory agency comments during their reviews of the FFS Report and the Proposed Plan. The State regulators support the selection of Alternative 5.2 as the preferred remedy.

2.8.8.6 Site 6 - Firing Range Landfill Sites

The Air Force has responded to all State regulatory agency comments during their reviews of the FFS Report and the Proposed Plan. The State regulators support the selection of Alternative 6.3 as the preferred remedy.

2.8.9 Community Acceptance

This is an assessment of the general public response to the Proposed Plan following a review of the public comments received on the RI Report, FFS Report, and Proposed Plan during the public comment period and open community meeting(s). Section 3.0 of this ROD documents the community acceptance of the selected remedy, as presented in the Responsiveness Summary.

2.9 The Selected Remedies

This section presents the remedies selected by the Air Force, with concurrence by the U.S. EPA and the State for each of the landfill sites. The selected remedies were chosen based on the results of the comparative analysis of the alternatives presented in Sections 2.8.1 through 2.8.9 and provide the best of trade-offs with respect to the nine evaluation criteria. All design and construction of the selected remedial actions conducted or supervised by a contractor of the Air Force (other than an agency of the federal government) will be designed or supervised as appropriate by a registered geologist licensed in the State of California, a licensed professional engineer, or other licensed professional, with experience appropriate to the type of work or document required.

2.9.1 Site 1 - Runway Overrun Landfill

Alternative 1.1 (No Action) was the only alternative developed for Site 1, hence it is the selected remedy. No refuse or contaminants were found during investigative activities. Therefore, it is believed that all refuse was removed prior to construction of the runway overrun. Since there is no refuse and no soil contamination at Site 1, no potential source for contamination to the groundwater exists.

2.9.2 Site 2 - "8150" Area Landfill

Alternative 2.2 (Capping) was selected by the Air Force, with concurrence by the U.S. EPA and the State as the remedy for Site 2. The selected remedy consists of installing a vegetative cover, monitoring of groundwater and landfill gas for at least 5 years, and invoking access restrictions (i.e., fencing and deed restrictions). Alternative 2.2 was chosen as the selected remedy for the following reasons:

- access restrictions and a vegetative cover prevent contact with the refuse and provide erosion control;

- the vegetative cover reduces precipitation infiltration and corresponding potential leachate generation at this site by up to 85 percent compared to existing site conditions;
- a vegetative cover is considered to be readily implementable utilizing existing resources and technologies; and
- costs associated with Alternative 2.2 are 36 percent less than Alternative 2.3.

2.9.3 Site 3 - Northeast Perimeter Landfill No. 1

Alternative 3.2 (Capping) was selected by the Air Force, with concurrence by the U.S. EPA and the State as the remedy for Site 3. The selected remedy consists of installing an engineered cap, monitoring of groundwater and landfill gas for at least 5 years, and invoking access restrictions (i.e., fencing and deed restrictions). Alternative 3.2 was chosen as the selected remedy for the following reasons:

- access restrictions and an engineered cap prevent contact with the refuse and provide erosion control;
- an engineered cap reduces precipitation infiltration and corresponding potential leachate generation at this site by up to 82 percent compared to current site conditions;
- an engineered cap is considered to be readily implementable utilizing existing resources and technologies; and
- costs associated with Alternative 3.2 are 20 percent less than Alternative 3.3.

2.9.4 Site 4 - Northeast Perimeter Landfill No. 2

Alternative 4.2 (Capping and Embankment) was selected by the Air Force, with concurrence by the U.S. EPA and the State as the remedy for Site 4. The selected remedy consists of installing an engineered cap, installing flood control measures (i.e., an embankment), monitoring of groundwater and landfill gas for at least 5 years, and invoking access restrictions (i.e., fencing and deed restrictions). Alternative 4.2 was chosen as the selected remedy for the following reasons:

- access restrictions and an engineered cap prevent contact with the refuse and provide erosion control;

- an engineered cap reduces precipitation infiltration and corresponding potential leachate generation at this site by up to 83 percent compared to existing site conditions;
- an engineered cap and flood controls are considered to be readily implementable utilizing existing resources and technologies; and
- costs associated with Alternative 4.2 are 16 percent less than Alternative 4.3.

2.9.5 Site 5 - Northeast Perimeter Landfill No. 3

Alternative 5.2 (Excavation and Consolidation) was selected by the Air Force, with concurrence by the U.S. EPA and the State as the remedy for Site 5. The selected remedy consists of excavating the landfill refuse, transporting it to, and consolidating it with refuse at the consolidation site (i.e., Site 4) and monitoring the groundwater for at least 5 years.

Alternative 5.2 was chosen as the selected remedy for the following reasons:

- exposure to the refuse at Site 5 is eliminated/reduced once the refuse is excavated;
- precipitation infiltration and corresponding potential leachate generation is eliminated once the source is removed;
- the area made available by excavation will be available for other land uses; and
- costs associated with Alternative 5.2 are 26 percent less than Alternative 5.3.

2.9.6 Site 6 - Firing Range Landfill Sites

Alternative 6.3 (Excavation and Consolidation) was selected by the Air Force, with concurrence by the U.S. EPA and the State as the remedy for Site 6. The selected remedy consists of excavating the landfill refuse, transporting it to, and consolidating it with refuse at the consolidation site (i.e., Site 4) and monitoring the groundwater for at least 5 years.

Alternative 6.3 was chosen as the selected remedy for the following reasons:

- exposure to the refuse at Site 6 is eliminated/reduced once the refuse is excavated;
- precipitation infiltration and corresponding potential leachate generation is eliminated once the source is removed; and

- the area made available by excavation will be available for other land uses.

2.10 Estimated Costs

Major costs associated with the selected remedies were estimated during the FFS and presented in the FFS Report [IT 1993e]. Costs are summarized in Tables 2.43 through 2.53. Cost estimates will be refined and finalized during the remedial design phase. On subsequent cost analyses (wholistic approach) savings were realized at Site 4 by excavating and consolidating Sites 5 and 6 to Site 4.

2.11 Statutory Determinations

The selected remedies satisfy the statutory requirements in CERCLA Section 121(b), as amended by SARA, in that the following mandates are attained:

- the selected remedies are protective of human health and the environment, will decrease site risks, and will not create short-term risks nor have cross-media consequences;
- the selected remedies comply with federal and State requirements that are applicable, or relevant and appropriate, to the remedial actions such as chemical-specific ARARs, location-specific clean-up standards, and action-specific ARARs for closure of the landfills;
- the selected remedies are cost-effective in their fulfillment of the nine CERCLA evaluation criteria through eliminating contact with the landfill contents; and
- the selected remedies utilize permanent solutions to the maximum extent practicable.

Table 2.45 Costs for the Selected Remedies

Selected Remedy	Cost Component	Total Dollars	Present Worth^a
Alternative 1.1	Capital	\$0	\$0
	Operation and Maintenance	\$0	\$0
	Total Costs	\$0	\$0
Alternative 2.2	Capital	\$543,233	\$511,189
	Operation and Maintenance	\$829,675	\$467,024
	Total Costs	\$1,372,908	\$978,213
Alternative 3.2	Capital	\$642,428	\$964,931
	Operation and Maintenance	\$2,885,960	\$1,624,507
	Total Costs	\$3,528,388	\$2,189,438
Alternative 4.2	Capital	\$1,512,173	\$1,382,684
	Operation and Maintenance	\$2,524,918	\$1,421,094
	Total Costs	\$4,037,091	\$2,803,778
Alternative 5.2	Capital	\$500,188	\$497,523
	Operation and Maintenance	\$645,059	\$518,270
	Total Costs	\$1,145,247	\$1,015,793
Alternative 6.3	Capital	\$2,184,098	\$2,184,098
	Operation and Maintenance	\$195,017	\$177,023
	Total Costs	\$2,379,115	\$2,361,121

^a Discount rate equals 5 percent

Table 2.46 Site 2 Estimated Cost Summary

Selected Remedy: Alternative 2.2 - Vegetative Cover

Capital Costs:

Access Restrictions	\$70,000
Vegetative Cover	\$140,536
Maintenance of Cover	\$21,000
Cover Repairs	\$8,104
Installation of Gas Vent and Monitoring Wells	\$14,400
Replacement of Dedicated Pumps	\$30,000
Replacement/Construction of Asphalt Road	\$118,356
 Sub Total of Capital Costs	 \$402,395
 Bid Contingency of 15%	 \$60,359
Scope Contingency of 15%	\$60,359
Permitting Costs of 5%	\$20,120
 Total Capital Costs	 \$543,233

Operation and Maintenance Costs:

Sampling of Existing Groundwater Wells	
Year 1-5	\$25,148
Year 6-30	\$12,574
 Sampling of Landfill Gas Vent and Monitoring Wells	
Year 1-5	\$13,552
Year 6-30	\$6,776
 Labor for Writing Reports	
Year 1-5	\$4,400
Year 6-30	\$2,200
 Miscellaneous O&M	
Year 1-5	\$4,310
Year 6-30	\$2,155
 Total O&M Cost/Year	
Year 1-5	\$47,410
Year 6-30	\$23,705

Table 2.47 Site 2 Estimated Cost Summary, Present Worth Calculation

Table 2.48 Site 3 Estimated Cost Summary

Selected Remedy: Alternative 3.2 - Engineered Cap

Capital Costs:

Access Restrictions	\$65,000
Engineered Cap	\$257,239
Maintenance of Cap	\$36,000
Cap Repairs	\$16,533
Installation of Gas Vent and Monitoring Wells	\$8,400
Replacement of Dedicated Pumps	\$90,000
Replacement/Construction of Unpaved Road	\$2,700
 Sub Total of Capital Costs	 \$475,873
 Bid Contingency of 15%	 \$71,381
Scope Contingency of 15%	\$71,381
Permitting Costs of 5%	\$23,794
 Total Capital Costs	 \$642,428

Operation and Maintenance Costs:

Sampling of Existing Groundwater Wells	
Year 1-5	\$133,288
Year 6-30	\$66,644
 Sampling of Landfill Gas Vent and Monitoring Wells	
Year 1-5	\$7,832
Year 6-30	\$3,916
 Labor for Writing Reports	
Year 1-5	\$8,800
Year 6-30	\$4,400
 Miscellaneous O&M	
Year 1-5	\$14,992
Year 6-30	\$7,496
 Total O&M Cost/Year	
Year 1-5	\$164,912
Year 6-30	\$82,456

Table 2.49 Site 3 Estimated Cost Summary, Present Worth Calculation

Table 2.50 Site 4 Estimated Cost Summary

Selected Remedy: Alternative 4.2 - Engineered Cap and Embankment

Capital Costs:

Access Restrictions	\$100,000
Engineered Cap	\$682,968
Maintenance of Cap	\$96,000
Cap Repairs	\$44,089
Installation of Gas Vent and Monitoring Wells	\$9,300
Replacement of Dedicated Pumps	\$75,000
Embankment	\$88,046
Maintenance/Repair of Embankment	\$24,726

Sub Total of Capital Costs	\$1,120,129
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Bid Contingency of 15%	\$168,019
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Scope Contingency of 15%	\$168,019
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Permitting Costs of 5%	\$56,006
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Total Capital Costs	\$1,512,173
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Operation and Maintenance Costs:

Sampling of Existing Groundwater Wells	
Year 1-5	\$112,540
Year 6-30	\$56,270

Sampling of Landfill Gas Vent and Monitoring Wells	
Year 1-5	\$9,636
Year 6-30	\$4,818

Inspection of Embankment	
Year 1-5	\$110
Year 6-30	\$110

Labor for Writing Reports	
Year 1-5	\$8,800
Year 6-30	\$4,400

Miscellaneous O&M	
Year 1-5	\$13,109
Year 6-30	\$6,560

Total O&M Cost/Year	
Year 1-5	\$144,195
Year 6-30	\$72,158

Table 2.51 Site 4 Estimated Cost Summary, Present Worth Calculation

Table 2.52 Site 5 Estimated Cost Summary

Selected Remedy: Alternative 5.2 - Excavation and Consolidation

Capital Costs:

Preliminary Design Investigation	\$17,961
Post-Excavation Verification Sampling Program	\$8,035
Excavation/Consolidation	\$220,076
Prorated Cost to Cap Consolidation Site	\$106,738
Replacement of Dedicated Pumps	\$10,500
Replacement/Construction of Unpaved Road	\$7,200
 Sub Total of Capital Costs	 \$370,510
 Bid Contingency of 15%	 \$55,576
Scope Contingency of 15%	\$55,576
Permitting Costs of 5%	\$18,525
 Total Capital Costs	 \$500,188

Operation and Maintenance Costs:

Sampling of Existing Groundwater Wells	
Year 1-5	\$81,418
Year 6-30	\$40,709
 Labor for Writing Reports	
Year 1-5	\$8,800
Year 6-30	\$4,400
 Miscellaneous O&M	
Year 1-5	\$9,022
Year 6-30	\$4,511
 Total O&M Cost/Year	
Year 1-5	\$99,240
Year 6-30	\$49,620

Table 2.53 Site 5 Estimated Cost Summary, Present Worth Calculation

Table 2.54 Site 6 Estimated Cost Summary

Selected Remedy: Alternative 6.3 - Excavation and Consolidation

Capital Costs:

Preliminary Design Investigation	\$80,297
Post-Excavation Verification Sampling Program	\$35,487
Excavation/Consolidation	\$927,489
Prorated Cost to Cap Consolidation Site	\$560,177
Replacement/Construction of Unpaved Road	\$14,400
Sub Total of Capital Costs	\$1,617,800
Bid Contingency of 15%	\$242,678
Scope Contingency of 15%	\$242,678
Permitting Costs of 5%	\$80,893
Total Capital Costs	\$2,184,098

Operation and Maintenance Costs:

Sampling of Existing Groundwater Wells Year 1-3	\$50,296
Labor for Writing Reports Year 1-3	\$8,800
Miscellaneous O&M Year 1-3	\$5,910
Total O&M Cost/Year Year 1-3	\$65,006

Table 2.55 Site 6 Estimated Cost Summary, Present Worth Calculation

2.11.1 *Protection of Human Health and the Environment*

As reported in the Group 2 Sites RI Report [IT 1993c] and the Landfill OU FFS Report [IT 1993e], current onsite cancer risks are calculated to be within the range considered to be acceptable by the U.S. EPA (i.e., 10^{-4} to 10^{-6} carcinogenic risk). Installation of a vegetative cover at Site 2 will reduce risk through controlling exposure pathways and natural degradation. Installation of engineered caps at Sites 3 and 4 will reduce risk through controlling exposure pathways and facilitating natural degradation. Both the vegetative covers and engineered caps will prevent contact with the landfill contents, provide erosion control, and comply with landfill closure regulations. At Sites 5 and 6, risk will be eliminated by removing the source through excavation and consolidation of the refuse and associated soils. Five-Year Site Reviews will apply to the selected remedies [55 FR 8730] since during the period of remediation, hazardous substances will remain on site possibly in concentrations above health-based levels.

The selected remedies do not pose unacceptable short-term risks to human health or the environment during implementation. Appropriate health and safety procedures would be developed and implemented to assist in worker protection particularly when the selected remedy requires the refuse to be excavated and consolidated.

2.11.2 *Compliance with Applicable or Relevant and Appropriate Requirements*

2.11.2.1 *Site 1 - Runway Overrun Landfill*

No remedial action was necessary for Site 1 because all refuse has been removed and there is no soil contamination and no potential for groundwater contamination.

2.11.2.2 *Site 2 - "8150" Area Landfill*

The selected remedy, when complete, will satisfy federal and State ARARs and TBCs. Installation of a vegetative cover will reduce infiltration into the refuse, thereby reducing the potential for leachate generation and migration of contaminants to the groundwater. The vegetative cover for Site 2 incorporates the appropriate substantive requirements of federal and state ARARs. Monitoring of groundwater (under the established Base groundwater monitoring program) and landfill gases will be conducted. The integrity of the vegetative cover will be preserved through proper construction and maintenance. A summary of ARARs are presented in Tables 2.42 and 2.43.

2.11.2.3 *Site 3 - Northeast Perimeter Landfill No. 1*

The selected remedy, when complete, will satisfy federal and State ARARs and TBCs. Installation of an engineered cap will reduce infiltration into the refuse, thereby reducing the potential for leachate generation and migration of contaminants to the groundwater. The engineered cap at Site 3 incorporates the appropriate substantive requirements of federal and State ARARs. Monitoring of groundwater (under the established Base groundwater monitoring program) and landfill gases will be conducted. The integrity of the engineered cap will be preserved through proper construction and maintenance. A summary of ARARs are presented in Tables 2.42 and 2.43.

The selected remedy, when complete, will also satisfy the DLM TBC, since the chemicals present at Site 3 do not pose an appreciable risk to the groundwater. Maximum concentrations of manganese and lead exceeded the limits determined by DLM. The concentration of manganese is most likely within the range of background concentration. The concentration of lead appears to exceed background. Acenaphthalene also exceeded the DLM limit; however, the water quality goal established for this was based on risk calculations using the polycyclic aromatic hydrocarbons category for carcinogens. Acenaphthalene is a Class D carcinogen and the risk-based goal is overconservative. The chemical also tends to bind in the soils and the potential for impact to the groundwater is limited.

Construction of an engineered cap at Site 3 will not impact the wetlands which have been identified near the site, and thus will comply with the substantive requirements of the location-specific ARARs and TBCs.

2.11.2.4 Site 4 - Northeast Perimeter Landfill No.2

The selected remedy, when complete, will satisfy federal and State ARARs and TBCs. Installation of an engineered cap will reduce infiltration into the refuse, thereby reducing the potential for leachate generation and migration of contaminants to the groundwater. The engineered cap at Site 4 incorporates the appropriate substantive requirements of federal and State ARARs. Monitoring of groundwater (under the established Base groundwater monitoring program) and landfill gases will be conducted. The integrity of the engineered cap will be preserved through proper construction and maintenance. A summary of ARARs are presented in Tables 2.42 and 2.43.

The selected remedy, when complete, will also satisfy the DLM TBC, since the chemicals present at Site 4 do not pose an appreciable risk to the groundwater. Manganese and

exceeded the limits as determined by DLM; however, the manganese concentration is most likely within the range of background concentration.

2.11.2.5 Site 5 - Northeast Perimeter Landfill No.3

The selected remedy, when complete, will satisfy federal and State ARARs and TBCs. Removal of refuse from the site will eliminate any potential for contaminant migration to the groundwater. Additionally, excavation and consolidation, in lieu of installation of a cap, complies with Chapter 15 requirements. A summary of ARARs are presented in Tables 2.42 and 2.43.

The selected remedy, when complete, will also satisfy the DLM TBC, since the chemicals present at Site 5 do not pose an appreciable risk to the groundwater. Maximum concentrations of manganese, barium, and vanadium exceeded the limits as determined by DLM. The concentrations of manganese and barium are most likely within the range of background concentration. The concentration of vanadium does not constitute a HQ > 1, so vanadium is not a COPC. Excavation of the refuse and associated soils containing these constituents will remove them from the pathway to the groundwater.

2.11.2.6 Site 6 - Firing Range Landfill Sites

The selected remedy, when complete, will satisfy federal and state ARARs and TBCs. Removal of refuse from the site will eliminate any potential for contaminant migration to the groundwater. Additionally, excavation and consolidation, in lieu of installation of a cap, complies with Chapter 15 requirements. A summary of ARARs are presented in Tables 2.42 and 2.43.

The selected remedy, when complete, will also satisfy the DLM, TBC. Manganese, lead, and antimony exceeded the limits as determined by DLM. The potential impacts from manganese include taste and odor considerations and not potential human health considerations. Antimony WET results were the same order of magnitude as the calculated soluble designated level as detailed in the DLM guidance.

2.11.3 Cost Effectiveness

2.11.3.1 Site 1 - Runway Overrun Landfill

No-action, which is defined as current site conditions, was the selected remedy for Site 1. No costs are associated with this remedy.

2.11.3.2 Site 2 - "8150" Area Landfill

The FFS determined that either Alternative 2.2 or 2.3 is effective in preventing contact with the landfill contents and complying with regulations governing the closure of landfills.

Alternative 2.2 reduces risk through controlling exposure pathways (i.e., vegetative cover), while Alternative 2.3 eliminates risk at the site by removing the source (i.e., excavation and consolidation). As shown in Section 2.8.7.2, Alternative 2.2 (the selected remedy) is less costly than Alternative 2.3.

2.11.3.3 Site 3 - Northeast Perimeter Landfill No. 1

The FFS determined that either Alternative 3.2 or 3.3 is effective in preventing contact with the landfill contents and complying with regulations governing the closure of landfills.

Alternative 3.2 reduces risk through controlling exposure pathways (i.e., engineered cap), while Alternative 3.3 eliminates risk at the site by removing the source (i.e., excavation and consolidation). As shown in Section 2.8.7.3, Alternative 3.2 (the selected remedy) is less costly than Alternative 3.3.

2.11.3.4 Site 4 - Northeast Perimeter Landfill No. 2

The FFS determined that Alternative 4.2 and 4.3 are equally effective in preventing contact with the landfill contents and complying with regulations governing the closure of landfills.

Both alternatives reduce risk through controlling exposure pathways (i.e., engineered cap). However, Alternative 4.2 requires construction of flood controls. As shown in Section 2.8.7.4, Alternative 4.2 (the selected remedy) is less costly than Alternative 4.3.

2.11.3.5 Site 5 - Northeast Perimeter Landfill No. 3

The FFS determined that either Alternative 5.2 or 5.3 is effective in preventing contact with the landfill contents and complying with regulations governing the closure of landfills.

Alternative 5.2 eliminates risk at the site by removing the source (i.e., excavation and consolidation), while Alternative 5.3 reduces risk through controlling exposure pathways (i.e., engineered cap). Additionally, it is necessary to excavate and consolidate a portion of

the landfill that occupies an intermittent stream. As shown in Section 2.8.7.5, Alternative 5.2 (the selected remedy) is less costly than Alternative 5.3.

2.11.3.6 Site 6 - Firing Range Landfill Sites

The FFS determined that either Alternative 6.2 or 6.3 is effective in preventing contact with the landfill contents and complying with regulations governing the closure of landfills.

Alternative 6.2 reduces risk through controlling exposure pathways (i.e., vegetative covers), while Alternative 6.3 eliminates risk at the site by removing the source (i.e., excavation and consolidation). Alternative 6.3 (the selected remedy) was estimated in the FFS to be more costly than Alternative 6.2 but cost savings are expected at Site 4 due to consolidation.

2.11.4 Utilization of Permanent Solutions and Alternative Treatment (or Resource Recovery) Technologies to the Maximum Extent Practicable

The selected remedies at the Landfill OU Sites utilize permanent solutions to the maximum extent practicable. The selected remedy for Site 1 is the no-action alternative, since no refuse or contamination exists there is no risk. The selected remedy for Sites 2, 3, and 4 is the containment remedy (i.e., vegetative cover or engineered cap). The selected remedy for Sites 5 and 6 is excavation, transportation to, and consolidation of the refuse at the consolidation site (i.e., Site 4). These remedies were chosen because no onsite hot spots exist that represent major sources of contamination, and no unacceptable risk exists from the landfills in their current state. These characteristics excluded remedies in which contaminants could be excavated and treated in a cost-effective manner.

2.11.5 Preference for Treatment as a Principal Element

Treatment of the principal threats of the sites was not found to be practicable. Therefore, the selected remedies do not satisfy the statutory preference for treatment as a principal element of the remedies. Remedies in which contaminants could be excavated and treated in a cost-effective manner are precluded because no onsite "hot spots" exist that represent major sources of contamination, and no unacceptable risk exists from the landfills in their current state,

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3.0 Responsiveness Summary

The public comment period for the Proposed Plan for the Landfill Operable Unit at Mather AFB, began on February 1, 1994, and ended on March 3, 1994. A public meeting was held on the evening of February 15, at which the Landfill Proposed Plan was summarized, and questions and public comments solicited. The transcript from the public meeting is included in the Administrative Record. The public asked 3 questions and made two comments on the Landfill Proposed Plan at the public meeting; these are recorded in the transcript and repeated below. The comment by the County of Sacramento was presented verbally and also submitted in writing. The written comment from the County of Sacramento is also included in the Administrative record. No other comments were received during the public comment period. Questions as well as comments are addressed in this responsiveness summary.

1. Question #1, from Mr. Coughran, on the presence of intermittent streams at sites 5 and 6 (pp. 35-40 of transcript):

Excerpt from public meeting transcript, page 35:

13 MR. COUGHRAN: I'm a little confused by this

14 document.

15 The description of the sites, Site 6 cites an

16 intermittent stream. Site 5 is not. But in the discussion

17 of the alternatives, Alternative 5.3 refers to an

18 intermittent stream. And then the discussion of the

19 alternatives for Site 6 there's no reference to the stream.

20 So I'm confused about which site the stream is on

21 or are there two or --

22 DR. SMITH: There is a stream at 5, yes, and there
23 is a stream at 6 also. And the stream at 6 goes right
24 between the north and south landfills. The stream is down
25 at the lowest part and you come up and over here. So the

Excerpt from public meeting transcript, page 36:

1 two landfills are over here. They are not in the stream.
2 The stream actually goes through them, but the landfills
3 themselves are not.

4 MR. COUGHRAN: The stream does not go through the
5 landfills?

6 DR. SMITH: No. The landfills are to the side on
7 6.

8 Our contractor here has something. You want to
9 say something, Bryant?

10 MR. KROUTCH: Sure. My name is Bryant Kroutch and
11 I'm with IT Corporation, as an environmental consultant to
12 the Air Force.

13 To help answer your question and clear up the
14 discrepancy about the streams and where exactly they exist
15 and what impacts they may or may not have.

16 This is very quick schematic that we used in a
17 previous life or a previous presentation of Site 6, which
18 again is down in that southeastern corner of the base.

19 And you can see they refer to the northern lobe of
20 the contamination and the southern lobes of contamination or
21 landfill material.

22 Here is the intermittent stream channel that flows
23 between them.

24 The reason why this intermittent stream channel is
25 not really addressed during the remedial alternatives is

Excerpt from public meeting transcript, page 37:

1 that they have done the calculations to show the extreme
2 latitudes of the hundred-year floods or exactly during a
3 100-year storm event how much of the surrounding area would
4 be inundated with the floodwaters. Those floodwaters do not

5 impact either the north or the southern lobe at Site 6.

6 And because the fact that there are no impacts
7 from the 100-year flood engineering controls to circumvent
8 any floodwater hitting the landfill were not necessary and a
9 moot point.

10 MR. COUGHRAN: That's fine. I have no problem
11 with that.

12 But the document implies that in the one case that
13 there is a intermittent stream there that apparently is of
14 some significance because it's mentioned and it's not
15 mentioned in the proposed solution.

16 I'm just suggesting that the document itself,
17 okay, appears to have an inconsistency in it.

18 MR. KROUTCH: What I'm hoping to do here or
19 provide solutions to those inconsistencies so that it's
20 clear in your mind for you at this meeting today.

21 And here's a schematic of Site 5 and I can show
22 you very quickly there is essentially an intermittent stream

23 channel that's dry 11 and a half months out of the year,
24 essentially, that runs down through this area down in
25 through here.

Excerpt from public meeting transcript, page 38:

1 And the reason why it's necessary to be evaluated
2 in the remedial alternatives evaluation is because again
3 those hundred-year storm waters show that this little stream
4 actually has some water in it during that storm event and
5 because this intermittent stream flows or at least goes
6 across an area that contains landfill refuse, okay, remedial
7 alternatives had to be developed to take the potential for
8 that 100-year storm into account.

9 And the two alternatives were to excavate the
10 portion of refuse that was occupied in this intermittent
11 stream channel that could potentially be flooded and get it
12 out of there and put it back with refuse that would not be
13 inundated by floodwaters, or simply excavate all of it at
14 Site 5 and take it to the consolidation site at Site 4.

15 In either scenario the intermittent stream channel
16 no longer contains refuse.

17 MR. COUGHRAN: I understand.

18 But I don't think you understand my point.

19 MR. KROUTCH: I think I do and I can't speak for
20 that document without having it here. It very well may have
21 an inconsistency. I have to look at it.

22 MODERATOR WHITTEN: I think what you see is an
23 inconsistency is the reason the stream channel was mentioned
24 in Site 6 is because there are two landfills that are
25 physically separated by this stream. The stream doesn't

Excerpt from public meeting transcript, page 39:

1 have anything to do with the remedial action.

2 So, yes, it's a physical geological portion of the
3 site but that stream does not affect what we do as a
4 remedial action because both of these landfills are actually
5 up on a little hill. You got a hill here and a hill here
6 with a stream going between them.

7 So no matter what the stream does it doesn't
8 impact the site.

9 MR. COUGHRAN: I'm not suggesting it does. I'm
10 *simply suggesting that the lay reader like myself who reads*
11 this document doesn't see that, all of this background
12 information.

13 MODERATOR WHITTEN: I think your point is well
14 taken. You see a stream line once, you don't see it
15 another, there maybe isn't enough background.

16 One of the things that I'll put in a plug now for
17 the RAB, the Restoration Advisory Board, there are
18 bookshelves of documents backing up the action.

19 MR. COUGHRAN: I'm sure.

20 MODERATOR WHITTEN: And members of the RAB are
21 more than welcome to come in and investigate those.

22 This is a summary. In a summary sometimes you're
23 going to maybe leave out details and maybe make an error of
24 omission and if it's misled you here that's probably an

25 error or omission.

Excerpt from public meeting transcript, page 40:

1 MR. COUGHRAN: It doesn't mislead me, it just
2 raised a question in my mind and I assumed that it might
3 raise the same question in somebody else's mind.

4 MODERATOR WHITTEN: Yes.

5 MR. KROUTCH: Is that the reference on page 4,
6 sir, that you're giving of the intermittent stream channel?

7 MR. COUGHRAN: Right.

8 MR. KROUTCH: That is a geographic reference to
9 allow people to understand that there is northern lobe and a
10 southern lobe and I can see --

11 MR. COUGHRAN: I have no problem with that. I'm
12 just suggesting that in the description of Site 5 it might
13 be well to mention the fact that there is a stream there
14 since it's addressed in the alternative. Okay.

15 MR. HUGHES: I will propose that we include that
16 in the Record of Decision to reflect your comment and make

17 it more clear in the final document.

18 MR. COUGHRAN: That's all I'm suggesting.

19 MODERATOR WHITTEN: And it will be.

Air Force Response to question number 1: There are intermittent streams at both landfill sites 5 and 6. The stream channel at Site 5 passes over buried refuse, while the stream channel at Site 6 passes between the two refuse burial areas. The text of the Record of Decision will clarify that intermittent streams exist at both sites.

2. Question #2, from Mr. Coughran, on why fencing is needed if the remedial control technologies are effective (pp. 40-43 of transcript):

Excerpt from public meeting transcript, page 40:

20 MR. COUGHRAN: And I had one other question.

21 Under the proposed actions for Sites 2, 3, 4 and 6

22 the statement is used that says controlled technologies,

23 which is passive gas vents, fencing and land use

24 restrictions would be imposed.

25 And those are either caps or you have the

Excerpt from public meeting transcript, page 41:

1 vegetative cover and I think the difference is kind of

2 academic as far as I'm concerned.

3 I assume from the fact that hypothetical future

4 uses are considered that we don't really know what the
5 future uses of the sites are going to be, which makes me
6 wonder why if the controls are effective we're going to put
7 a fence around it.

8 DR. SMITH: Okay. It is basically consistent.

9 For example, if we go to Landfill 6 why did we put
10 a fence around it? It's passive recreation. Okay.

11 If you want to build a golf course there, which I
12 think the County is planning on, that is passive recreation.
13 You have limited access to a golf course.

14 John Q. Bagadonuts cannot bring his dirt bike on
15 there and tear up your cap.

16 Well, the fence is until it is fixed, and at this
17 stage we don't know.

18 But let us say you come in, whoever has this, they
19 come in and say we want to build a golf course. You're
20 going to put a fence around that golf course, you're going
21 to have limited access. This fence around the landfill is

22 no longer needed unless there is a health risk. Then we
23 have other problems.

24 But basically that fence at this stage of the game
25 is to tell you you want controlled access even if it is

Excerpt from public meeting transcript, page 42:

1 passive recreation and until you tell us specifically what
2 it is, that's why the fence there. That is not concrete.
3 That's just what we're proposing.

4 Now, if you come in and say, oh, God, we're going
5 to build a golf course, then we don't need that fence around
6 the landfill or you can control it. We just want to keep
7 dirt bike -- because these caps are to keep the water from
8 getting down and taking any contaminant that might be there
9 to there.

10 If you tear up the cap, why put it on there? And
11 this is what it is, this is part of the cap protection.

12 MR. COUGHRAN: Makes sense to me.

13 I would suggest --

14 DR. SMITH: If you put a parking lot there that
15 would protect it.

16 MR. COUGHRAN: In your document you indicate that
17 this is some kind of an interim solution pending a decision
18 about how the property is going to be used or something.

19 DR. SMITH: All of the remedial actions are
20 usually that way until it is fixed exactly what it's going
21 to be there. We --

22 MR. COUGHRAN: But this document doesn't say that,
23 is what I'm saying.

24 DR. SMITH: We've probably fallen short on that.

25 MR. COUGHRAN: I read this document and it sounds

Excerpt from public meeting transcript, page 43:

1 to me -- someone less charitable than I could say that what
2 you're talking about doing is throw some dirt and some weed
3 seed on it and putting barbed wire around it and say the
4 problem is gone away. And I don't think that's what you're
5 saying.

6 DR. SMITH: No. You're right.

7 MR. COUGHRAN: But the impression is we put a
8 fence around it so everything is okay.

9 DR. SMITH: Okay.

Air Force response to question number 2: The remedial alternatives that consist of capping protect public health and the environment by constructing vegetative cover(s) or engineered caps over the landfill refuse, and allowing the venting of gases formed as the refuse decomposes. The cover will be designed to prevent exposure to the refuse, and to reduce the amount of rainwater and surface runoff that can come into contact with the refuse and possibly carry dissolved contaminants down to the groundwater. Fencing will likely be needed to restrict unauthorized access in order to protect the landfill covers. In addition, if it is determined that there is an unacceptable health threat associated with exposure to the vented landfill gases, access will also be restricted to prevent such an exposure. The actual placement of fences will be determined during the detailed remedial design, and would likely be based upon more detailed gas dispersion modeling and risk assessment, and confirmed by air monitoring. The fence will be placed in order to achieve the least constraints on the use of surrounding land consistent with the protection of human health and the environment.

The gas dispersion modeling performed as a part of the Focused Feasibility Study predicts that the landfill gases can be vented without treatment, but there could be a risk from long-term exposure of gases near the vent locations. The assumptions used in modeling are conservative; the true distance from each vent over which the gases present an unacceptable health threat (if any) will only be known after designing and constructing the landfill caps or covers, and passive gas control systems. When measurements are made of the actual gases vented from each capped or covered landfill, a determination of any access restrictions necessary can be made.

3. Question #3, from Mr. Richard Anders, on whether Site 5 is being consolidated within its own boundaries or with another site (p. 43 of transcript):

Excerpt from public meeting transcript, page 43:

11 MR. ANDERS: Richard Anders.

12 Site 5, your alternative is excavation and
13 consolidation. Is that you're going to excavate at the end
14 where the 100-year stream is and consolidate it at the other
15 end where it is or be consolidated with some other site?

16 DR. SMITH: Actually our action we're taking all
17 of 5 out and that's going to 4, because it's such a small
18 amount there that if you bring in your heavy equipment to do
19 all of this, to do this little bit, the cost to do the rest
20 of it is basically insignificant. The cost of -- some of
21 this equipment is very expensive, the earth movers. Once
22 it's there, the operators are there you might as well just
23 finish the whole job.

24 Obviously the best remedial thing you could do is
25 get everything out so everything is pristine, but this is a

Excerpt from public meeting transcript page 44:

1 real world and a lot of times we can't.

Air Force response to question number 3: Alternative 5.2 consists of removing all the refuse at Site 5 and consolidating it with the Site 4 landfill. This is the alternative proposed in the Proposed Plan and presented in the public meeting on February 15, 1994. Alternative 5.3 consists of excavating portions of Site 5 subject to flooding by the 100-year storm event, and consolidating this material in other portions of Site 5. Alternative 5.2 has been selected in this Record of Decision.

4. Comment #1, from the County of Sacramento, presented by Mr. Randall Yim, opposing the proposed action for Site 6. The comment is repeated below as it appears on pages 44-53 of the public meeting transcript, with additions from the written comment inserted in brackets. The written comment is included as an attachment to this responsiveness summary.

Excerpt from public meeting transcript, page 44:

4 MR. YIM: We have extensive public testimony on
5 behalf of the County.

6 My name is Randall Yim. I'm an independent
7 environmental counsel for the County of Sacramento,
8 providing this testimony on behalf of the County of
9 Sacramento.

10 We're also providing a copy of our testimony in
11 writing for purposes of this forum, so that we may receive
12 written responses to the testimony that's being provided
13 tonight. So let me summarize it briefly for the people that
14 are here.

15 The County of Sacramento is the single designated
16 local reuse entity for Mather.

17 The County objects to the Air Force's proposed
18 remedial alternative for Landfill Site No. 6, which proposes
19 that the landfill be capped [with a vegetative cover,] and fenced in place, passively
20 vented for hazardous landfill gases [emissions].

21 As currently modeled by the Air Force the fence
22 that would encircle that landfill would have a radius of
23 approximately 420 feet, be [extend] in excess of 4300 lineal feet, be
24 eight feet high in chain link with one access point. [This would be security fence,
with only one access allowed.]

25 The passive gas venting stack is modeled to reduce

Excerpt from public meeting transcript, page 45:

1 the health risk to acceptable limits to be about 25 feet
2 high.

3 A buffer zone must be created around any passive
4 gas venting stacks to comply with the air dispersion models
5 to mitigate health risks created by the Air Resources Board,
6 and primarily to mitigate the impacts of vinyl chloride or

7 benzene, known carcinogens [as potential health threats] that may be generated in
this

8 landfill. The threat may extend beyond the boundaries of
9 the Mather Air Force Base property.

10 The County, as I said, objects to this particular
11 proposed remedy and instead insists that the Landfill No. 6
12 be excavated and consolidated with existing landfills on
13 base.

14 And it's only in this way that we believe that
15 President Clinton's five-point plan for productive reuse of
16 [closing] military bases be implemented.

17 And in addition it's only by selection of the
18 excavation remedy do we believe that the Air Force complies
19 with the Department of Defense policy articulated in
20 testimony provided before the Senate's Armed Services
21 Committee on May 20, 1993 from Deputy Undersecretary of
22 Defense for Environmental Security, Ms. Sherry Wasserman-
23 Goodman, who stated, quote, "that one of the most important
24 changes we can make to accelerate cleanup is to match future

25 land use plans to cleanup standards."

Excerpt from public meeting transcript, page 46:

1 That's the bulk of our concerns that we have
2 raised in previous correspondence provided to the Air Force
3 through the Department of Toxic Substances Control,
4 principally our correspondence dated November 30th, 1993,
5 which is incorporated into our written version of this
6 public testimony.

7 And to review briefly, to summarize our
8 objections, we do not believe that the Air Force has
9 adequately considered several of the evaluation criteria
10 mandated by U.S. EPA in evaluating remedies in CERCLA or
11 Superfund sites, of which Mather is.

12 First, the selected remedy in comparison to the
13 excavation alternative does not enhance overall protection
14 of human health and the environment.

15 Secondly, the selected remedy does not ensure
16 long-term effectiveness and permanence.

17 Third, the selected remedy does nothing to reduce
18 toxicity, mobility and volume of the problem.

19 Fourth, we believe and dispute the Air Force
20 figures that the cost of excavation, we believe, compares
21 very favorably to the cost of capping and fencing in place.

22 Indeed, the Integrated Waste Management Board, a
23 California agency, in its November 15th correspondence to
24 DTSC, estimates that the present worth cost, if you reduce
25 to present dollars, 1994 dollars, the cost of capping and

Excerpt from public meeting transcript, page 47:

1 fencing with the long-term monitoring that would be
2 required, even without considering the loss of the value of
3 property or the loss of the utility of the property by the
4 restricted access, would be either equivalent to or even
5 less than the cost of excavation and consolidation of the
6 property.

7 In addition the Air Force has failed to consider
8 the hidden costs by the selection of this remedy. It shifts

9 many of the enforcement, liability concerns, maintenance
10 responsibilities to the County of Sacramento or whatever
11 entity is going to have ownership and control of that
12 particular property.

13 And finally one of the most important criteria
14 that EPA uses in selecting remedies is the community
15 acceptability of a particular remedy.

16 And here Sacramento County as a community does not
17 accept remediation alternatives which severely restrict
18 productive use of the property, regardless of whether
19 [the County of] Sacramento has ownership of that property or not.

20 A remedial alternative which is selected which
21 creates the potential for short- and long-term health
22 exposures is also not acceptable.

23 It is not -- the County has already developed a
24 regional land use plan that designates active and passive
25 recreation for this particular area.

Excerpt from public meeting transcript, page 48:

1 It is not acceptable to this community to allow
2 the Air Force to select a remedy, particularly of Landfill
3 6, which imposes significant land use restrictions and
4 frustrates that [comprehensive] regional [land use] plan.

5 The Air Force itself has stated in its own policy
6 documents, one entitled "The United States Air Force
7 Environmental Restoration Program Future Use Considerations
8 in the Cleanup of Air Force Installations," as long ago as
9 October '92 that "We should not as a nation write off parcels
10 of land to restrictive uses..." And that we feel very strongly
11 about in the County of Sacramento.

12 Again, summarizing some of our concerns, we
13 believe that the cost of excavation of Landfill 6 compares
14 very favorably to the cost of capping and fencing when you
15 reduce it to present value and consider the long-term
16 monitoring responsibilities if that landfill was left in
17 place.

18 And that analysis does not take into consideration

19 a loss of productivity of that property nor the increased
20 construction costs that would be incurred by whoever
21 controls that property if they wish to build any structure
22 or make any productive use upon that.

23 The land use restrictions are unacceptable to the
24 County.

25 These land use restrictions are attached to our

Excerpt from public meeting transcript, page 49:

1 testimony and detailed quite a bit. It's about this much of
2 our testimony, our packet, in Title 14 of California's
3 administrative regulations.

4 And these restrictions can be divided into two
5 categories, direct land use restriction and future land use
6 disincentives, such as increased construction costs and
7 maintenance responsibilities.

8 In addition, we believe that the fair market value
9 of the landfill property itself and the surrounding property
10 is substantially reduced as a result of leaving that

11 landfill in place.

12 What we did is summarize some of the land use
13 restrictions in the material that we will be submitting to
14 the Air Force. These include restrictions set out in the
15 regulations which require prior approval of any construction
16 improvements, significant additional construction costs, for
17 example in the setting of a foundation for structures that
18 penetrate into a landfill by the placing of utilities to
19 prevent the migration of landfill gas with a leaching of
20 material into the groundwater of surrounding areas,
21 significant addition of utility construction costs, creation
22 of a 1,000-foot buffer zone around the waste holding area
23 such that any structures constructed within that buffer area
24 must meet and contain significant additional gas mitigation
25 measures.

Excerpt from public meeting transcript, page 51:

1 And we believe that demonstrates that's another
2 reason why the County is opposed to capping and leaving that

3 landfill in place and why U.S. EPA in developing its
4 selection criteria stressed overall protection of human
5 health and the environment, long-term effectiveness and
6 permanence, not an interim solution, and emphasis on
7 reduction of toxicity and mobility.

8 So again we in the County oppose the imposition of
9 arbitrary land use restriction on redevelopment plans when
10 reasonable alternatives exist that do not create such land
11 use restrictions.

12 As a summary, in our testimony we provided a
13 matrix listing some of the possible land uses and possible
14 land use restrictions given the various scenarios that could
15 be created with the capping and fencing in place.

16 And some of the variables would be the nature of
17 the cap, either a vegetative cap or a Chapter 15 cap, a hard
18 cap as people have been talking about, or gas control
19 measures that are either active or passive, more aggressive
20 or less aggressive.

21 The types of land uses that we anticipate need to
22 be evaluated and suitability would be. For example, we just
23 listed ten different land uses that can be conceived of for
24 any piece of property, residential low-density, residential
25 high-density, schools, recreation passive, recreation

Excerpt from public meeting transcript, page 52:

1 active. These are not what are being planned, we're listing
2 all of the possible land uses. Commercial high-density,
3 commercial low-density, industrial or manufacturing,
4 roadways or utilities.

5 We believe the consensus among the regulatory
6 agencies in the county is that none of those land uses could
7 be allowed on this property as presently proposed without
8 significant additional mitigation, significant additional
9 construction costs, significant additional measures being
10 taken to mitigate the health impacts, the health risks where
11 the land use restrictions that would be imposed by leaving
12 that landfill in place.

13 And let's talk about some of those land use
14 restrictions just in summary.

15 We listed about ten. Controlled access, a
16 1,000-foot buffer zone outside the landfill area, prior
17 approval of any construction, increased construction costs,
18 special utility worker protection, special foundation
19 requirements, special gas collection systems, special gas
20 monitoring, and annual maintenance because landfills settle
21 and the ground slumps. And the unequal settling, the need
22 to continuing to fill.

23 As we went through our matrix we believe all of
24 the land use restrictions would apply, again without
25 significant mitigation measures.

Excerpt from public meeting transcript, page 53:

1 So you're looking at a situation where uses would
2 be restricted significantly. Land use restrictions would be
3 imposed as a condition of this remedy. That's unacceptable
4 to the County of Sacramento. We think that's unacceptable

5 to the nation because we're writing off pieces of property.

6 We'd ask the Air Force to consider our proposals

7 and responding to the Remedial Investigation Feasibility

8 Studies.

Air Force response to comment number 1: The several points in the commentary will be addressed individually.

a. Pages 44 - 45 of transcript, concerning fence, stack, and buffer zone:

Excerpt from public meeting transcript, page 44:

21 As currently modeled by the Air Force the fence

22 that would encircle that landfill would have a radius of

23 approximately 420 feet, be in excess of 4300 lineal feet, be

24 eight feet high in chain link with one access point.

25 The passive gas venting stack is modeled to reduce

Excerpt from public meeting transcript, page 45:

1 the health risk to acceptable limits to be about 25 feet

2 high.

3 A buffer zone must be created around any passive

4 gas venting stacks to comply with the air dispersion models

5 to mitigate health risks created by the Air Resources Board,

6 and primarily to mitigate the impacts of vinyl chloride or
7 benzene, known carcinogens that may be generated in this
8 landfill. The threat may extend beyond the boundaries of
9 the Mather Air Force Base property.

Air Force response to above comment: The gas dispersion modeling performed as a part of the Focused Feasibility Study predicts that the landfill gases can be vented without treatment, but there could be a risk from long-term exposure of gases near the vent locations. The gas control system configuration modeled consisted of a single vent stack. The assumptions used in modeling are conservative; the true distance from each vent over which the gases present an unacceptable health threat (if any) will only be known after designing and constructing the landfill caps or covers, and passive gas control systems. When measurements are made of the actual gases vented from each capped or covered landfill, a determination of any access restrictions necessary can be made. The size, location, and number of access points of a perimeter fence will be based upon more detailed site-specific modeling conducted during the remedial design of the gas control system for landfill Site 6.

b. (p. 46 of transcript) "The selected remedy in comparison to the excavation alternative does not enhance overall protection of human health and the environment."

Air Force response to above comment: EPA Guidance for evaluating remedial alternatives against the nine evaluation criteria is contained in "Conducting Remedial Investigations/Feasibility Studies for CERCLA Municipal landfill Sites," document EPA/540-P-91/001, dated February 1991. The assessment of overall protection of human health and the environment is based on evaluating how each of the following potential threats has been addressed in terms of a composite of factors assessed under the other evaluation criteria, especially long-term effectiveness and permanence, short-term effectiveness, and compliance with ARARs. The excavation and consolidation alternative is considered to have the same long-term effectiveness as a cover in place, with many of the same short-term concerns of exposure to workers, and exposure to community of dust, noise, traffic, etc., and also potential community exposure through volatilization of waste. Both alternatives comply with ARARs. Therefore both the

vegetative cover and the excavation and consolidation alternatives are considered to be similarly protective of human health and the environment.

c. (p. 46 of transcript) "Secondly, the selected remedy does not ensure long-term effectiveness and permanence."

Air Force response to above comment: The balancing criteria of 'long-term effectiveness and permanence' is evaluated based on the degree of certainty that the alternatives will be successful over the long term. Factors considered include (i) the residual risk posed by untreated waste remaining at the conclusion of remedial activities, and (ii) the adequacy and reliability of controls necessary to manage any untreated waste or treatment residuals.

Alternatives 6.2 and 6.3 are judged equally effective and permanent. These two alternatives both include long-term maintenance of the landfill cover and monitoring of landfill gas and groundwater. Alternative 6.1 is judged less permanent because the current cover allows water to pond and infiltrate into the refuse, thereby causing a long-term threat to the underlying groundwater.

d. (p. 46 of transcript) "Third, the selected remedy does nothing to reduce toxicity, mobility and volume of the problem."

Air Force response to above comment: Remedial technologies that satisfy this criteria, such as incineration, were considered during the development of alternatives in the Focused Feasibility Study. An alternative incorporating a technology to reduce toxicity, mobility or volume would be significantly more costly and would present a higher short-term risk of exposure during handling of the landfill contents.

Alternatives 6.1, 6.2, and 6.3 all fail to reduce toxicity, mobility and volume of the landfill waste. However, alternatives 6.2 and 6.3 significantly restrict infiltration of water into the waste, thereby reducing the degree of leachate formation and reducing the threat of future groundwater contamination.

e. Excerpt from public meeting transcript (pp. 46-47):

"Fourth, we believe and dispute the Air Force figures that the cost of excavation, we believe, compares very favorably to the cost of capping and fencing in place.

Indeed, the Integrated Waste Management Board, a California agency, in its November 15th correspondence to DTSC, estimates that the present worth cost, if you reduce to present dollars, 1994 dollars, the cost of capping and fencing with the long-term monitoring that would be required, even without considering the loss of the value of property or the loss of the utility of the property by the restricted access, would be either equivalent to or even less than the cost of excavation and consolidation of the property.

In addition the Air Force has failed to consider the hidden costs by the selection of this remedy. It shifts many of the enforcement, liability concerns, maintenance responsibilities to the County of Sacramento or whatever entity is going to have ownership and control of that particular property."

From written comment submitted by County of Sacramento:

"As stated by the California Integrated Waste Management board, in its comments to the proposed remedy selection dated November 15, 1993:

'The [cost comparison between excavation and capping in place] showed capital costs of the excavation alternative 6.3, exceed the capping alternative 6.2. However, the long term operation and maintenance of the landfill cap and the associated environmental monitoring and control systems showed an overall cost savings of as much as 53% for the excavation alternatives.'

The Waste Board's analysis did not even consider the additional costs of capping and fencing, both direct and indirect, such as reduced property values, increased construction costs, increased maintenance and security costs, and threats to human health and the environment. If the costs for two alternative remedial alternatives are equivalent, the Air Force is obligated to choose that alternative which best enhances reuse plans, and does not limit or restrict future land uses."

Air Force response to above comment: The Air Force cost estimates are based upon the remedial alternatives as described in the Focused Feasibility Study. The cost estimates presented in the Focused Feasibility Study are estimated for a 30-year period for each alternative, and are discounted to present value for purposes of comparison. These cost

estimates show a present value of \$1,048,008 for Alternative 6.2, and a present value of \$2,361,121 for Alternative 6.3.

These cost estimates assume continued Air Force responsibility for long-term operation and maintenance of the landfill covers, gas control systems, monitoring wells, and all other components of the remedial action. Therefore there is not a shift of hidden costs to future land users.

The cost estimates presented in the Integrated Waste Management Board's (IWMB) letter of November 15, 1994, were based upon different assumptions. Four assumptions differed in the IWMB analysis. The IWMB estimated costs for Alternative 6.2 with the addition of an active gas treatment system added. Screening models presented in the Focused Feasibility Study indicate that an active gas treatment system is not necessary to control landfill gas emissions. The IWMB estimate for Alternative 6.3 omitted three components of the alternative developed in the Focused Feasibility Study. These components are (i) the conduct of a pre-excavation sampling program to estimate the volume of any soil underlying the waste that might need to be excavated, (ii) the incorporation of the waste at the consolidation site, and (iii) the cost of replacing unpaved roads at the excavation site.

The remedial project managers from the U.S. EPA, California EPA, and the Air Force have held discussions on comparative cost subsequent to public comment period, in which they considered the inclusion of a more rigorous landfill gas monitoring program under Alternative 6.2, and reassessed the cost of consolidating refuse at Site 4 under Alternative 6.3. The Air Force estimated a present value for alternative 6.2 with the more rigorous monitoring program to be about 1.35 million dollars, and believed a reasonable estimate for Alternative 6.3 is about 2 million dollars. Additional cost savings are expected at Site 4 by consolidation of waste therefore making the cost more equal at Site 6.

f. "And finally one of the most important criteria that EPA uses in selecting remedies is the community acceptability of a particular remedy. And here Sacramento County as a community does not accept remediation alternatives which severely restrict productive use of the property, regardless of whether Sacramento has ownership of that property or not. A remedial alternative which is selected which creates the potential for short- and long-term health exposures is also not acceptable. It is not -- the County has already

developed a regional land use plan that designates active and passive recreation for this particular area. It is not acceptable to this community to allow the Air Force to select a remedy, particularly of Landfill 6, which imposes significant land use restrictions and frustrates that regional plan. The Air Force itself has stated in its own policy documents, one entitled "The United States Air Force Environmental Restoration Program Future Use Considerations and Cleanup of Air Force Installations," as long ago as October '92 that we should not as a nation write off parcels of land to restrictive uses. And that we feel very strongly about in the County of Sacramento."

Air Force response to above comment: The Final Supplemental Record of Decision for the Disposal and Reuse of Mather AFB, dated November 21, 1994, documents that the Air Force will offer parcel C, containing landfill Site 6, for negotiated/public sale. At the time of the public comment meeting on February 15, 1994, the landfill was part of Parcel G, which was to have been conveyed through the National Park Service to Sacramento County to use as parkland.

Some productive uses of portions of these parcels may need to be restricted. The 5.3 acres containing refuse at Site 6 will have the most severe restriction: a radius estimated to be no greater than 420 feet radius around a central vent stack may require access restrictions to limit exposure to landfill gases; and construction on-site within 1000 feet of the landfills must incorporate protection against the possible sub-surface migration of landfill gases.

f. "The land use restrictions are unacceptable to the County.

These land use restrictions are attached to our testimony and detailed quite a bit. It's about this much of our testimony, our packet, in Title 14 of California's administrative regulations. And these restrictions can be divided into two categories, direct land use restriction and future land use disincentives, such as increased construction costs and maintenance responsibilities. In addition, we believe that the fair market value of the landfill property itself and the surrounding property is substantially reduced as a result of leaving that landfill in place. What we did is summarize some of the land use restrictions in the material that we will be submitting to the Air Force. These include restrictions set out in the regulations which require prior approval of any construction improvements, significant additional construction costs, for example in the setting of a foundation for structures that penetrate into a landfill by the placing of utilities to prevent the migration of landfill gas with a leaching of material into the groundwater of surrounding areas, significant addition of utility construction costs, creation of a 1,000-foot buffer zone around the waste holding area such that any structures constructed

within that buffer area must meet and contain significant additional gas mitigation measures.

And we believe that demonstrates that's another reason why the County is opposed to capping and leaving that landfill in place and why U.S. EPA in developing its selection criteria stressed overall protection of human health and the environment, long-term effectiveness and permanence, not an interim solution, and emphasis on reduction of toxicity and mobility.

So again we in the County oppose the imposition of arbitrary land use restriction on redevelopment plans when reasonable alternatives exist that do not create such land use restrictions.

As a summary, in our testimony we provided a matrix listing some of the possible land uses and possible land use restrictions given the various scenarios that could be created with the capping and fencing in place. And some of the variables would be the nature of the cap, either a vegetative cap or a Chapter 15 cap, a hard cap as people have been talking about, or gas control measures that are either active or passive, more aggressive or less aggressive.

The types of land uses that we anticipate need to be evaluated and suitability would be. For example, we just listed ten different land uses that can be conceived of for any piece of property, residential low-density, residential high-density, schools, recreation passive, recreation active. These are not what are being planned, we're listing all of the possible land uses. Commercial high-density, commercial low-density, industrial or manufacturing, roadways or utilities.

We believe the consensus among the regulatory agencies in the county is that none of those land uses could be allowed on this property as presently proposed without significant additional mitigation, significant additional construction costs, significant additional measures being taken to mitigate the health impacts, the health risks where the land use restrictions that would be imposed by leaving that landfill in place.

And let's talk about some of those land use restrictions just in summary.

We listed about ten. Controlled access, a 1,000-foot buffer zone outside the landfill area, prior approval of any construction, increased construction costs, special utility worker protection, special foundation requirements, special gas collection systems, special gas monitoring, and annual maintenance because landfills settle and the ground slumps. And the unequal settling, the need to continuing to fill.

As we went through our matrix we believe all of the land use restrictions would apply, again without significant mitigation measures. So you're looking at a situation

where uses would be restricted significantly. Land use restrictions would be imposed as a condition of this remedy. That's unacceptable to the County of Sacramento. We think that's unacceptable to the nation because we're writing off pieces of property.

We'd ask the Air Force to consider our proposals and responding to the Remedial Investigation Feasibility Studies.

Air Force response to above comment: The implementation of Alternative 6.3 will result in no long term land use restrictions at Site 6.

4. Comment #2, from Joe Shackelford, (p. 53 of transcript):

Excerpt from public meeting transcript, page 53:

4 MR. SHACKELFORD: I'm Joe Shackelford.

5 I have a comment.

6 The delay of the use of the land and the

7 forfeiture of the government having an income from the land,

8 is that a considering factor that we factored into all these

9 things?

10 For an example, by delaying the landfills for that

11 particular area, would that be profitable if they did a

12 temporary and later redid certain portions for Landfill 6

13 for an example?

14 If this is going to take several years to do and

15 hold up the land itself, maybe it would be more economical

16 for the American people to say we will accept a more logical
17 solution that cost us less money keeping that off the
18 market.

Air Force response comment number 2: The timeframe for implementing alternatives 6.2 (construction of a vegetative cap) and 6.3 (excavation and consolidation) are similar. As estimated in the Focused Feasibility Study for the Landfill Operable Unit, the cost for excavation exceeds the cost for capping in place. However, the conveyance and/or sale of surrounding land need not be held up by the implementation of the remedial actions at the landfill sites.

All remedial actions selected in the Record of Decision (ROD) are required by law to be implemented within 15 months of the completion of the Remedial Investigation/ Feasibility Study, considered by the Air Force to be the date the ROD is signed.

APPENDIX A

Administrative Record Index

**ADMINISTRATIVE RECORD
MATHER AIR FORCE BASE, CALIFORNIA**

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Jun 82	Phase I, Records Search Report	CH2M Hill	4
04 Oct 82	CRWQCB Letter to AFRCE Transmitting Comments on Records Search Report	Johnson, William S California Regional Water Quality Control Board	5
18 Jan 83	Phase IIA, Presurvey Report	Engineering-Science Inc.	7
03 Oct 83	CRWQCB Letter to Base Concurring with Phase IIB SOW	Pinkos, Thomas R California Regional Water Quality Control Board	9
06 Dec 83	Memorandum of Record, Coordination Meeting With State Regulatory Agencies	Korycinski, Dennis, Capt USAF Hosp/SGPB	10
20 Dec 83	CRWQCB Letter to Base Transmitting Summary of 6 Dec 83 Meeting	Pinkos, Thomas R California Regional Water Quality Control Board	11
15 Feb 84	USAF OEHL Letter to MAJCOM Transmitting Proposed Modification to Phase II SOW	Sanders, Dee Ann USAF OEHL/CVT	12
01 Aug 84	CDHS Letter to Base Outlining State Requirements	Allen, James T California Department of Health Services	14
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20 Aug 84	Minutes of 20 Aug 84 TWG Meeting	Slaughter, John T, Col 323 ABG/CC	16

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24 Oct 84	Minutes of 1 Oct 84 TWG Meeting	Slaughter, John T, Col 323 ABG/CC	17
04 Dec 84	EPA Letter to Base Providing Comments on Phase I and II Documents	Seraydarian, Harry EPA Region IX	18
05 Dec 84	Minutes of 26 Oct 84 IRP Meeting	Slaughter, John T, Col 323 ABG/CC	19
Jan 85	Phase II Stage 1, Draft Final Report	Roy F. Weston, Inc.	20
10 Feb 85	CDHS Letter to Base Concerning Drilling Technique for Phase II Stage 3	Allen, James T California Department of Health Services	21
18 Apr 85	Minutes of 18 Apr 85 IRP Work Group	Bost, Thomas D, LtCol 323 ABG/CC	24
23 Apr 85	CDHS Letter to Base Providing Comments on Phase II Stage 2 SOW	Karoly, B T California Department of Health Services	25
25 Apr 85	EPA Letter to Base Providing Comments on Proposed Phase II Stage 2 SOW	Clifford, Jerry EPA Region IX	27
29 May 85	County Letter to Base Providing Comments on Draft Phase II Stage 2 SOW	Knight, K Kenneth Sacramento County Health Department	28
21 May 85	CDHS Letter to Base Transmitting Comments on Proposed Phase II, Stage 2 SOW	Landis, Anthony J California Department of Health Services	29
12 Jul 85	Phase II Stage 2, Confirmation/Quantification SOW	USAF Hosp/SGPB	32

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11 Sep 85	Base Letter to MAJCOM Transmitting Review Comments on Second Draft of Phase II Stage 1 Report	Curran, James P, Capt USAF Hosp/SGPB	33
01 Oct 85	CRWQCB Letter to Base Transmitting Comments on Draft Phase II Stage 3 SOW	Matteoli, Robert J California Regional Water Quality Control Board	34
23 Oct 85	EPA Letter to Base Transmitting Comments on Draft Phase II Stage 3 SOW	Clifford, Jerry EPA Region IX	35
Dec 85	Phase II Stage 1, Draft Confirmation/Quantification Report, Vol I of II	Roy F. Weston, Inc.	36
Dec 85	Phase II Stage 1, Draft Confirmation/Quantification Report, Vol II of II	Roy F. Weston, Inc.	37
19 Dec 85	CDHS Letter to Base Providing Review Comments on Phase II Stage 3 SOW	Allen, James T California Department of Health Services	38
02 Jan 86	Base Letter to CDHS Concerning Progression of Phase II	Johnson, Bruce R, Col 323 ABG/CC	41
06 Feb 86	CRWQCB Letter to Base Transmitting Review Comments on Phase II Stage 1 Report, Off-Base Monitoring Results, and Monitoring Results on Phase II Stage 2 Wells	Pinkos, Thomas R California Regional Water Quality Control Board	43
06 Mar 86	CDHS Letter to Base Transmitting Comments on Phase II Stage 1 Draft Report	Jones, Jeanine California Department of Health Services	45

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13 Mar 86	EPA Letter to Base Providing Review Comments on Draft Phase II Stage 1 Report	Clifford, Jerry EPA Region IX	46
26 Mar 86	County Letter to Base Providing Review Comments on Draft Phase II Stage 1 Report	Knight, K Kenneth Sacramento County Health Department	47
Jun 86	Phase II Stage 1, Final Confirmation/Quantification Report, Vol I of II	Roy F. Weston, Inc.	49
Jun 86	Phase II Stage 1, Final Confirmation/Quantification Report, Vol II of II, Appendices	Roy F. Weston, Inc.	50
Jun 86	Phase II Stage 2, Draft Confirmation/Quantification Report	Aerovironment Inc.	51
19 Jun 86	Base Letter to Assemblyman Providing Status of Clean-up Program	Johnson, Bruce R, Col 323 ABG/CC	52
27 Jun 86	Memorandum for Record Concerning Technical Advisory Group Meeting Held 25 Jun 86	Curran, James P, Capt USAF Hosp/SGPB	54
25 Jul 86	News Release, "Groundwater Report Released"	323 FTW/PA	55
01 Aug 86	CRWQCB Letter to Base Transmitting Comments on Phase II Stage 1 Report	Matteoli, Robert J California Regional Water Quality Control Board	57
08 Aug 86	CDHS Letter to Base Advising of Deficiencies of Phase II Stage 3 QAP	McLaughlin, Charles A. California Department of Health Services	58

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05 Feb 87	CRWQCB Letter to Base Providing Review Comments on Phase II Stage 2 Report	Matteoli, Robert J California Regional Water Quality Control Board	61
06 Feb 87	MAJCOM Letter to Base Concerning State Requirement for Landfill Gas Testing	Schiller, Ronald L, LtCol HQ ATC/SGPB	62
10 Feb 87	CDHS Letter to Base Transmitting Comments on Draft Phase II Stage 2 Report	Wang, David California Department of Health Services	63
11 Feb 87	EPA Letter to Base Transmitting Comments on Draft Phase II Stage 2 Report	Zimpfer, Amy K EPA Region IX	64
17 Feb 87	CDHS Letter to Base Providing Comments on Draft Phase II Stage 2 Confirmation/Quantification Report	Karoly, B T California Department of Health Services	65
25 Feb 87	CRWQCB Letter to Base Advising of Requirement to Perform a Solid Waste Water Quality Assessment Test	Matteoli, Robert J California Regional Water Quality Control Board	67
Mar 87	Phase II Stage 3, Draft Confirmation/Quantification Report, Vol. I of II	Aerovironment Inc.	68
Mar 87	Phase II Stage 3, Draft Confirmation/Quantification Report, Vol II of II	Aerovironment Inc.	69
21 Apr 87	SCAPCD Letter to Base on Screening Questionnaires for Inactive Solid Waste Disposal Sites	Skelton, Eric P Sacramento County Air Pollution Control District	72

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Jun 87	Phase II Stage 2, Final Confirmation/Quantification Report, Vol II of II	Aerovironment Inc.	74
27 Jun 87	Memo for Record on Technical Advisory Group Meeting	Curran, James P, Capt USAF Hosp/SGPB	79
17 Jul 87	Base Letter to County Air Pollution Control District on Proposed Gas Testing Plan	Johnson, Bruce R, Col 323 ABG/CC	81
12 Aug 87	CDHS Letter to Base on Phase II Stage 3, Draft Confirmation/Quantification Report	Karoly, B T California Department of Health Services	85
27 Aug 87	CRWQCB Letter to Base on Phase II Stage 3 Groundwater Investigation Report	Matteoli, Robert J California Regional Water Quality Control Board	87
28 Aug 87	EPA Letter to Base on Phase II Stage 3 Draft Report	Zimpfer, Amy K EPA Region IX	88
02 Sep 87	Base Hydrogeologist Comments on Phase II Stage 3, Second Final Draft Report	Shaffer, James D 323 CES/DEEV	90
02 Sep 87	CDHS Letter to Base on Phase II Stage 3, Confirmation/Quantification Report	Wang, David California Department of Health Services	91
14 Sep 87	EPA Letter to Base on Phase II Stage 2, Final Confirmation/Quantification Report	Zimpfer, Amy K EPA Region IX	92
18 Sep 87	RI/FS, Technical Proposal, Part A	IT Corp.	93

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15 Oct 87	CRWQCB Letter to Base on Solid Waste Assessment Test Waiver Denial	Matteoli, Robert J California Regional Water Quality Control Board	94
22 Dec 87	Minutes of 15 Dec 87 TRC Meeting	Kosovac, Don E, Col 323 FTW/EM	98
Jan 88	Phase II Stage 3, Confirmation/Quantification Report	Aerovironment Inc.	99
06 Jan 88	Phase IVA, Draft Landfill Gas Testing Work Plan	IT Corp.	100
13 Jan 88	County Letter to Contractor Approving Draft Landfill Gas Testing Work Plan	Skelton, Eric P Sacramento County Air Pollution Control District	101
27 Jan 88	Contractor Letter to County Providing Copy of Final Landfill Gas Testing Work Plan	Bradley, A Allen IT Corp.	102
27 Jan 88	Final Landfill Gas Testing Work Plan	IT Corp.	103
09 Feb 88	Minutes of 27 Jan 88 Mini TRC Meeting	Kosovac, Don E, Col 323 FTW/EM	104
23 Mar 88	OEHL Letter to Base Providing Response to Comments on Phase II Stage 3 Report	Gibson, David P, Jr. Capt USAF OEHL/TSS	129
01 Apr 88	Base News Release, "Groundwater Report Released"	323 FTW/PA	130
02 Apr 88	Newspaper Article, "Unsafe Toxic Levels Found At Mather"	Gibson, Steve Sacramento Bee	131

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11 Apr 88	Declaration for Proof of Publication, Notice of Release of Phase II Stage 3 Report and 20 Apr 88 Public Meeting	Graham, Barbara L Sacramento Union	134
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13 May 88	EPA Letter to Base Transmitting Comments on Phase II Stage 3 Final Confirmation/Quantification Report	Anderson, Julie EPA Region IX	138
14 Jun 88	MAJCOM Letter to EPA Providing Responses to EPA Comments on Phase II Stage 3 Final Report	Saenz, Jose L, LtCol HQ ATC/DEEV	141
30 Jun 88	Minutes of 30 Jun 88 TRC Meeting	Blank, Richard A, LtCol 323 FTW/EM	142
Jul 88	Landfill Gas Testing Report for Eight Sites	IT Corp.	143
29 Jul 88	Phase IVA, Well Redevelopment and Sampling Plan	IT Corp.	144
15 Aug 88	CRWQCB Letter to Base Providing Comments on Well Redevelopment and Sampling Plan	Guadagnino, Philip G California Regional Water Quality Control Board	146
17 Aug 88	CDHS Letter to Base Transmitting Review Comments on Revised Well Redevelopment and Sampling Plan, 29 July 88	Wang, David California Department of Health Services	147
18 Aug 88	EPA Letter to MAJCOM Transmitting Comments on Well Redevelopment and Sampling Plan, 29 Jul 88	Seid, Raymond EPA Region IX	148
Sep 88	RI/FS, Draft Work Plan, Vol I of V	IT Corp.	149
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Nov 88	RI/FS, Draft Site Inspection Report	IT Corp.	155
30 Nov 88	Minutes of 6 Oct 88 TRC Meeting	Blank, Richard A, LtCol 323 FTW/EM	156
07 Dec 88	CRWQCB Letter to MAJCOM Providing Comments on Draft RI/FS Work Plan Documents	Matteoli, Robert J California Regional Water Quality Control Board	157
08 Dec 88	EPA Letter to MAJCOM Transmitting Review Comments on RI/FS Draft Work Plans	Chesnutt, John D EPA Region IX	158
29 Dec 88	CDHS Letter to MAJCOM Transmitting Review Comments on RI/FS Draft Work Plans	Wang, David California Department of Health Services	159
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06 Mar 89	Minutes of 12 Jan 89 TRC Meeting	Blank, Richard A, LtCol 323 FTW/EM	163
26 Apr 89	CDHS Letter to Base Concerning Monitoring Well Sampling	Wang, David California Department of Health Services	166
01 May 89	Minutes of 6 Apr 89 TRC Meeting	Blank, Richard A, LtCol 323 FTW/EM	170

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20 Jul 89	Minutes of 10 Jul 89 TRC Meeting	Blank, Richard A, LtCol 323 FTW/EM	178
Oct 89	RI/FS, Draft Site Inspection Report	IT Corp.	187
03 Oct 89	Transcript of 3 Oct 89 TRC Meeting	Peters, Ronald J Peters Shorthand Reporting Corp.	188
18 Oct 89	CRWQCB Letter to Base Providing Review Comments on SWAT Report	Matteoli, Robert J California Regional Water Quality Control Board	181
Nov 89	RI/FS, Draft Work Plan for Investigations at Identified Sites, Vol I of IV	IT Corp.	190
Nov 89	RI/FS, Draft Sampling and Analysis Plan for Investigations at Identified Sites, Vol II of IV	IT Corp.	191
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Nov 89	RI/FS, Draft Health and Safety Plan for Investigations at Identified Sites, Vol IV of IV	IT Corp.	193
29 Nov 89	CRWQCB Letter to CDHS Providing Review Comments on RI/FS Draft Site Inspection Report	Matteoli, Robert J California Regional Water Quality Control Board	198

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01 Dec 89	CDHS Letter to Base Providing Comments on RI/FS Draft Site Inspection Report	Landis, Anthony J California Department of Health Services	200
12 Jan 90	EPA Letter to MAJCOM Transmitting Review Comments on the Nov 89 RI/FS Draft Work Plans	Chesnutt, John D EPA Region IX	202
16 Jan 90	CDHS Letter to Base Transmitting Comments on Nov 89 RI/FS Draft Work Plans for Identified Sites (Group 2 Sites)	Landis, Anthony J California Department of Health Services	203
16 Jan 90	Internal CRWQCB Memo Providing Review Comments on RI/FS Draft Sampling and Analysis Plan for Identified Sites	Mosbacher, Michael H California Regional Water Quality Control Board	204
30 Jan 90	Transcript of 30 Jan 90 TRC Meeting	Parks, Nadine J Peters Shorthand Reporting Corp.	206
20 Feb 90	Sampling and Analysis Report for Site Monitoring Wells, October/November 1988	IT Corp.	209
Mar 90	Base Newsletter, "IRP Community Update"	323 FTW/EM	210
07 Mar 90	Minutes of 30 Jan 90 TRC Meeting	Blank, Richard A, LtCol 323 FTW/EM	212

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23 Mar 90	Minutes of FFA 8 Mar 90 Project Managers Meeting	Blank, Richard A, LtCol 323 FTW/EM	214
Apr 90	RI/FS, Draft Final Work Plan, Vol I of IV, Group 2 Sites	IT Corp.	215
Apr 90	RI/FS, Draft Final Sampling and Analysis Plan, Vol II of IV, Group 2 Sites	IT Corp.	216
Apr 90	RI/FS, Draft Final Quality Assurance Project Plan, Vol III of IV, Group 2 Sites	IT Corp.	217
Apr 90	RI/FS, Draft Final Health and Safety Plan, Vol IV of IV, Group 2 Sites	IT Corp.	218
Apr 90	Draft Sampling and Analysis Plan for Quarterly Groundwater Sampling	EA Engineering, Science, and Technology	219
18 Apr 90	CDHS Letter to Base Concerning Recommendation for Stipulated Penalties for Group 2 Sites Work Plan	Diebert, Donn California Department of Health Services	221
25 Apr 90	MAJCOM Letter to Regulators Transmitting Background Data on No Further Action Decision Documents, LF-01, FT-08, FT-09, FT-10, RW-16, WP-17, OT-21, OT-22	Wentz, George HQ ATC/DEEV	222
10 May 90	Transcript of 10 May 90 TRC Meeting	McNulty, Bernadette Peters Shorthand Reporting Corp.	223

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17 May 90	CDHS Letter to Base Concerning Finalization of RI/FS Draft Final Work Plans, Group 2 Sites	Landis, Anthony J California Department of Health Services	224
21 May 90	EPA Letter to Base Concerning RI/FS Draft Final Work Plans, Group 2 Sites	Chesnutt, John D EPA Region IX	225
01 Jun 90	CRWQCB Letter to CDHS Providing Comments on No Further Action Decision Documents, LF-01, FT-08, FT-09, FT-10, RW-16, WP-17, OT-21, OT-22	Mosbacher, Michael H California Regional Water Quality Control Board	226
20 Jun 90	CDHS Letter to Base Providing Comments on No Further Action Decision Documents, LF-01, FT-08, FT-09, FT-10, RW-16, WP-17, OT-21, OT-22	Billington, Tracie L California Department of Health Services	227
22 Jun 90	EPA Letter to Base Providing Comments on No Further Action Decision Documents, LF-01, FT-08, FT-09, FT-10, RW-16, WP-17, OT-21, OT-22	Chesnutt, John D EPA Region IX	228
Jul 90	RI/FS, Solid Waste Water Quality Assessment Test, Draft Project Plans Addendum, Group 2 Sites	IT Corp.	230
25 Jul 90	RI/FS, Quality Assurance Project Plan Addendum	IT Corp.	248
Aug 90	RI/FS, Final Site Inspection Report	IT Corp.	253
02 Aug 90	Transcript of 2 Aug 90 TRC Meeting	Parks, Nadine J Peters Shorthand Reporting Corp.	254
06 Sep 90	Minutes of 2 Aug 90 TRC Meeting	Blank, Richard A, LtCol 323 FTW/EM	257

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19 Sep 90	CDHS Letter to Base Providing Comments on RI/FS Solid Waste Water Quality Assessment Test, Draft Project Plans Addendum, Group 2 Sites	Wang, David California Department of Health Services	258
19 Sep 90	EPA Letter to Base Providing Comments on RI Draft Work Plan Addendum, Group 2 Sites	Chesnutt, John D EPA Region IX	259
23 Oct 90	County Letter to Base Amending Sewer Use Permit for Disposal of Groundwater Well Development Water	Del Sarto, Glen Sacramento County Department of Public Works	263
23 Oct 90	Transcript of 23 Oct 90 TRC Meeting	Parks, Nadine J Peters Shorthand Reporting Corp.	264
Nov 90	RI/FS, Solid Waste Water Quality Assessment Test, Draft Final Project Plans Addendum, Group 2 Sites	IT Corp.	268
07 Nov 90	CDHS Letter to Base Approving Dual Completion Groundwater Monitoring Wells	Billington, Tracie L California Department of Health Services	269
09 Nov 90	MAJCOM Letter to EPA Transmitting No Further Action Decision Documents and Response to Regulatory Comments	Sizemore, Daniel L, LtCol HQ ATC/DEEV	270
09 Nov 90	MAJCOM Letter to CDHS Transmitting No Further Action Decision Documents and Response to Regulatory Comments	Sizemore, Daniel L, LtCol HQ ATC/DEEV	271
15 Nov 90	Transcript of 15 Nov 90 TRC Meeting	Parks, Nadine J Peters Shorthand Reporting Corp.	272

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19 Nov 90	Minutes of 23 Oct 90 TRC Project Managers Meeting	Blank, Richard A, LtCol 323 FTW/EM	274
28 Nov 90	CDHS Letter to Base Concerning Final Site Inspection Report and FS Draft Final Work Plan, AC&W Site	Wang, David California Department of Health Services	275
29 Nov 90	Minutes of 15 Nov 90 TRC Meeting	Blank, Richard A, LtCol 323 FTW/EM	276
19 Dec 90	EPA Letter to Base Providing Conditional Approval of Draft Final Project Plans Addendum for Group 2 Sites	Chesnutt, John D EPA Region IX	279
26 Dec 90	CDHS Letter to Base Approving Draft Final Project Plans Addendum for Group 2 Sites	Wang, David California Department of Health Services	280
Jan 91	Routine Groundwater Monitoring Draft Project Plans: Quality Assurance Project Plan, and Sampling and Analysis Plan	IT Corp.	282
Feb 91	Routine Groundwater Monitoring Project Plans: Quality Assurance Project Plan, and Sampling and Analysis Plan	IT Corp.	287
15 Feb 91	CRWQCB Letter to Base Transmitting Comments on Draft Final Project Plans Addendum, Group 2 Sites	Mosbacher, Michael H California Department of Health Services	289
28 Mar 91	Transcript of 28 Mar 91 TRC Meeting	Parks, Nadine J Peters Shorthand Reporting Corp.	296

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15 Apr 91	Minutes of 28 Mar 91 TRC Meeting	Blank, Richard A, LtCol 323 ABG/EM	299
May 91	Quarterly Groundwater Monitoring Report, Mar 1991	IT Corp.	301
01 May 91	CDHS Letter to Base Providing Comments on Draft Routine Groundwater Monitoring Project Plan	Wang, David California Department of Health Services	302
15 May 91	EPA Letter to Base Providing Comments on 31 Mar 91 Routine Groundwater Monitoring Program Project Plans	Moore, Katherine L EPA Region IX	305
23 May 91	CRWQCB Letter to Base Providing Comments on Routine Groundwater Monitoring Program Project Plans	Mosbacher, Michael H California Regional Water Quality Control Board	309
29 May 91	EPA Letter to Base Concerning Proposed Schedule of Primary Documents in the FFA	Moore, Katherine L EPA Region IX	310
18 Jun 91	Minutes of 21 May 91 TRC Meeting	Blank, Richard A, LtCol 323 ABG/EM	314
Jul 91	Quarterly Groundwater Monitoring Report, May 1991	IT Corp.	317
02 Jul 91	EPA Letter to Base Providing Comments on Quarterly Groundwater Monitoring Report, Mar 91	Moore, Katherine L EPA Region IX	318
25 Jul 91	Minutes of 25 Jul 91 Project Managers Meeting	Blank, Richard A, LtCol 323 ABG/EM	324

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20 Aug 91	Transcript of 20 Aug 91 TRC Meeting	Parks, Nadine J Peters Shorthand Reporting Corp.	330
Sep 91	Quarterly Groundwater Monitoring Report, Third Quarter 1991	IT Corp.	336
11 Apr 88	Public Meeting Notice on Phase II Stage 3	323 FTW/PA	337
17 Sep 91	Minutes of 20 Aug 91 TRC Meeting	Blank, Richard A, LtCol 323 FTW/EM	341
18 Sep 92	EPA Letter to Base Transmitting Comments on Draft Groundwater Operable Unit and Soil Operable Unit Focused Feasibility Study Work Plan	Moore, Katherine L	343
16 Oct 91	EPA Letter to Base Providing Comments on Jul 91 Quarterly Groundwater Monitoring Report	Moore, Katherine L EPA Region IX	349
03 Dec 91	EPA Letter to Base Transmitting Comments on Third Quarter 1991 Groundwater Monitoring Report	Moore, Katherine L EPA Region IX	359
05 Dec 91	Northern Trust Co. Letter to Base Transmitting A License Agreement Between RMC Lonestar, and United States of America	Carlisle, Kurt A Northern Trust Co.	361
Jan 92	Quarterly Groundwater Monitoring Report, Fourth Quarter 1991	IT Corp.	366
08 Jan 92	EPA Letter to Base on Review of Background Soils Sampling Strategy	Moore, Katherine L EPA Region IX	374

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23 Jan 92	Minutes of 9 Jan 92 RPM Meeting	Blank, Richard A, LtCol 323 FTW/EM	377
Mar 92	RI, Draft Report, Vol I of II, Group 2 Sites	Battelle Environmental Management Operations	386
Mar 92	RI, Draft Report, Vol II of II, Group 2 Sites	Battelle Environmental Management Operations	387
12 May 88	Base Letter to HAZWRAP on RI/FS SOW, Amendment 2	Saenz, Jose L, LtCol HQ ATC/DEEV	389
10 Mar 92	EPA Letter to Base Commenting on Fourth Quarter 91 Groundwater Monitoring Report	Moore, Katherine L EPA Region IX	394
27 Mar 92	Minutes of 11 Mar 92 RPM Meeting	Blank, Richard A, LtCol 323 FTW/EM	399
Apr 92	Draft Groundwater Monitoring Project Plans, Vol I: Sampling and Analysis Plan; Vol II: Quality Assurance Project Plan; Vol III: Health and Safety Plan	IT Corp.	401
03 Apr 92	FS, Draft Work Plan, OU-4	IT Corp.	404
22 Apr 92	Base Letter to MAJCOM Transmitting Comments on Internal Draft Landfill OU FS Work Plan	Blank, Richard A, LtCol 323 FTW/EM	407

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May 92	Field Investigation, Draft Sampling and Analysis Plan; Draft Quality Assurance Project Plan; Draft Health and Safety Plan, Vol II, III, and IV of IV, OU-2 and OU-3	IT Corp.	410
06 May 92	EPA Letter to Base on Review of RI, Draft Group 2 Report	Moore, Katherine L EPA Region IX	413
12 May 92	FS, Draft Work Plan, Landfill OU	Battelle Environmental Management Operations	415
20 May 92	Base Letter to HQ ATC/DEVR with Comments on Internal Draft Work Plan of Additional Field Activities for the Groundwater and Soils Operable Units	Blank, Richard A, LtCol 323 FTW/EM	417
Jun 92	Draft Work Plan, Additional Field Investigation, Soils and Groundwater OU, Vol I of IV	Battelle Environmental Management Operations	421
Jun 92	Draft Sampling and Analysis Plan, Quality Assurance Project Plan, and Health and Safety Plan for Additional Field Investigation at Soils and Groundwater OU, Vol II, III and, IV, of IV	Battelle Environmental Management Operations	422
03 Jun 92	Minutes of 3 Jun 92 TRC Meeting	Blank, Richard A, LtCol 323 FTW/EM	423
04 Jun 92	First Quarter Groundwater Monitoring Report	Battelle Environmental Management Operations	425

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15 Jun 92	CDTSC Letter to Base with Comments on RI, Group 2 Report	Billington, Tracie L California Department of Toxic Substances Control	432
06 Jul 92	Minutes of 3 Jun 91 TRC Meeting	Blank, Richard A, LtCol 323 FTW/EM	434
06 Jul 92	EPA Letter to Base on FS, Draft Work Plan for Landfill OU	Moore, Katherine L EPA Region IX	435
13 Jul 92	CDTSC Letter to Base on FS, Draft Final Preliminary Design Report, Landfill OU	Billington, Tracie L California Department of Toxic Substances Control	436
20 Jul 92	EPA Letter to Base on Review of Field Investigation Plan, OU-2 and OU-3	Moore, Katherine L EPA Region IX	439
20 Jul 92	EPA Letter to Base on Review of First Quarter Groundwater Monitoring Report	Moore, Katherine L EPA Region IX	440
27 Jul 92	CDTSC Letter to Base on Groundwater Monitoring Program	Billington, Tracie L California Department of Toxic Substances Control	442
28 Jul 92	CRWQCB Letter to Base on FS, Draft Work Plan for Landfill OU	Mosbacher, Michael H California Regional Water Quality Control Board	443
28 Jul 92	Transcript of 28 Jul 92 TRC Meeting	Medeiros, Vicki L Peters Shorthand Reporting Corp.	444
07 Aug 92	Quarterly Groundwater Monitoring Report, Second Quarter 1992	IT Corp.	448

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10 Aug 92	CDTSC Letter to Base on Additional Field Investigation Work Plan	Billington, Tracie L California Department of Toxic Substances Control	449
25 May 90	Minutes of 10 May 90 TRC Meeting	Blank, Richard A, LtCol 323 FTW/EM	451
28 Aug 92	CRWQCB Letter to Base on Draft Additional Field Investigation Work Plan for Soil and Groundwater OUs	Mosbacher, Michael H California Regional Water Quality Control Board	452
Sep 92	RI, Draft Final Report, Vol I of II, Group 2 Sites	Battelle Environmental Management Operations	453
Sep 92	RI, Draft Final Report, Vol II of II, Group 2 Sites	Battelle Environmental Management Operations	454
Sep 92	Draft Solid Waste Assessment Test Report, Vol I of II	IT Corp.	455
Sep 92	Draft Solid Waste Assessment Test Report, Vol II of II	IT Corp.	456
Sep 92	Draft Work Plan, Comprehensive Baseline Risk Assessment	IT Corp.	457
12 Sep 92	FS, Draft Final Work Plan, Landfill OU	IT Corp.	459
28 Sep 92	Base Letter HQ ATC/DEVR on Review of Base Soils Management Plan	Blank, Richard A, LtCol 323 FTW/EM	465

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29 Sep 92	IT Letter to Battelle on Draft Work Plan, Additional Field Investigation, Soils and Groundwater OUs, Vol I, II, and III	Robinson, Dennis M IT Corp.	469
30 Sep 92	EPA Letter to Base on Second Quarter 1992 Groundwater Monitoring Report	Moore, Katherine L EPA Region IX	471
May 92	Field Investigation, Final Work Plan, Vol I of IV, OU-2 and OU-3	IT Corp.	472
May 92	Field Investigation, Sampling and Analysis Plan; Quality Assurance Project Plan; Health and Safety Plan, Vol II, III, and IV of IV, OU-2 and OU-3	IT Corp.	473
09 Oct 92	EPA Letter to Base Providing Comments on FS, Draft Final Work Plan, OU-4	Moore, Katherine L EPA Region IX	475
09 Oct 92	EPA Letter to Base Transmitting Comments on RI Report, Group 2 Sites	Moore, Katherine L EPA Region IX	476
29 Oct 92	EPA Letter to Base Providing Comments on Draft Groundwater Monitoring Program Evaluation	Moore, Katherine L EPA Region IX	480
06 Nov 92	Quarterly Groundwater Monitoring Report, Third Quarter 1992	IT Corp.	483
12 Nov 92	EPA Letter to Base Transmitting Comments on Chapter 6 and Missing Appendices, RI Report, Group 2 Sites	Moore, Katherine L EPA Region IX	484
18 Nov 92	CRWQCB Notice of Public Hearing Concerning Invoking A Formal Dispute Over Soil Cleanup	Pearson, J Lawrence California Regional Water Quality Control Board	485

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18 Nov 92	EPA Letter to Base Transmitting Comments on Draft Final Soils and Groundwater OU Additional Field Investigation Work Plan, Sampling and Analysis Plan, and Quality Assurance Project Plan	Moore, Katherine L EPA Region IX	486
24 Nov 92	CDTSC Letter to MAJCOM Invoking Dispute Resolution on Draft Final "...Soils and Groundwater OU Additional Field Investigation..."	Wang, David California Department of Toxic Substances Control	490
30 Nov 92	CDTSC Letter to Base Transmitting Comments on Comprehensive Baseline Risk Assessment, Draft Work Plan, Sep 92	Billington, Tracie L California Regional Water Quality Control Board	493
07 Dec 92	Draft Soils Management Plan	IT Corp.	495
09 Dec 92	Minutes of 1 Dec 92 Meeting to Resolve the Additional Field Investigation Work Plan Dispute	Mosbacher, Michael H California Regional Water Quality Control Board	496
09 Dec 92	CDTSC Letter to Base Providing Summary of State and Local ARARs for Abandoned Landfills	Billington, Tracie L California Department of Toxic Substances Control	497
09 Dec 92	CRWQCB Letter to Base Providing Comments on Draft Final FS Work Plan, OU-4	Mosbacher, Michael H California Regional Water Quality Control Board	498
22 Dec 92	CRWQCB Letter to Base Providing Comments on Draft Groundwater Monitoring Program Evaluation	Mosbacher, Michael H California Regional Water Quality Control Board	503

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23 Dec 92	Base Letter to MAJCOM on Base Draft Soils Management Plan	Blank, Richard A, LtCol 323 FTW/EM	504
Jan 93	Draft Final Work Plan, Comprehensive Baseline Risk Assessment	IT Corp.	506
19 Jan 93	IT Letter with Comments to Base on Draft Final Work Plan, Comprehensive Baseline Risk Assessment	Dove, F Harvey IT Corp.	514
Feb 93	Draft Final Solid Waste Assessment Test Report, Vol I of II	IT Corp.	516
Feb 93	Draft Final Solid Waste Assessment Test Report, Vol II of II	IT Corp.	517
08 Feb 93	Quarterly Groundwater Monitoring Report, Fourth Quarter 1992	IT Corp.	519
26 Feb 93	CDTSC Letter to Base on Extension to FFA Enforceable Schedule	Billington, Tracie L California Department of Toxic Substances Control	524
Mar 93	Final Solid Waste Assessment Test, Vol I of II	IT Corp.	526
Mar 93	Final Solid Waste Assessment Test, Vol II of II	IT Corp.	527
Mar 93	Draft Background Groundwater Sampling Strategy	IT Corp.	529
08 Mar 93	EPA Letter with Comments to Base on Quarterly Groundwater Monitoring Report, Fourth Quarter	Moore, Katherine L EPA Region IX	531
19 Mar 93	CRWQCB Letter with Comments to Base on Quarterly Groundwater Monitoring Report, Fourth Quarter	Williams, Camilla California Regional Water Quality Control Board	533

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16 Apr 93	Focused FS, Draft Report, OU-4	IT Corp.	541
16 Apr 93	CRWQCB Letter to Base Concerning Additional Field Investigation Consensus Statement	Williams, Camilla California Regional Water Quality Control Board	543
16 Apr 93	IT Letter to Battelle EMO Transmitting Draft Final Soil Management Plan	Kroutch, G Bryant IT Corp.	544
16 May 93	EPA Draft Comments on Human Health Risk Assessment of CBRA	Serda, Sophia EPA Region IX	546
18 May 93	EPA Draft Comments on Draft Comprehensive Baseline Risk Assessment	Christopher, John P EPA Region IX	547
02 Jun 93	Quarterly Groundwater Monitoring Report, First Quarter 1993	IT Corp.	552
07 Jun 93	CRWQCB Letter to Base Providing Comments on Draft Final Work Plan, Appendix A: Background Soils and Groundwater Sampling Strategy	Taylor, James D California Regional Water Quality Control Board	553
07 Jun 93	EPA Letter to Base Transmitting Comments on Appendix A of Draft Final Comprehensive Baseline Risk Assessment Work Plan and Background Soils Sampling Strategy	Swarthout, Brian EPA Region IX	554
18 Jun 93	EPA Letter to Base Transmitting Comments on Draft Landfill OU Focused Feasibility Study	Swarthout, Brian EPA Region IX	555
18 Jun 93	CDTSC Letter to Base Providing Comments on the Focused Feasibility Study, Landfill OU	Strong, Kent California Department of Toxic Substances Control	557

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18 Jun 93	CRWQCB Letter to Base Transmitting Comments on Draft Focused FS Report, OU-4	Williams, Camilla California Regional Water Quality Control Board	558
18 Jun 93	Base Letter to Regulators Transmitting Draft Proposed Plan, OU-4	Smith, Charles H AFBDA/NW-D	559
Jul 93	Final Base Soils Management Plan	IT Corp.	562
08 Jul 93	Base Letter to CRWQCB on Landfill Closure Cover	Smith, Charles H AFBDA/NW-D	566
16 Jul 93	CDTSC Letter to Base on Draft Final Work Plan, Appendix A, Groundwater and Soil Sampling	Strong, Kent California Department of Toxic Substances Control	572
Aug 93	Draft Final Work Plan, Comprehensive Baseline Risk Assessment	IT Corp.	580
22 Sep 93	CRWQCB Letter to Base on Draft Final Work Plan, Comprehensive Baseline Risk Assessment	Williams, Camilla California Regional Water Quality Control Board	582
24 Sep 93	EPA Letter to Base on Draft Final Work Plan, Comprehensive Baseline Risk Assessment	Swarthout, Brian EPA Region IX	583
15 Oct 93	Focused FS, Draft Final Work Plan for Landfill OU	Battelle Environmental Management Operations	590

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15 Nov 93	CIWMB Letter to the Base on Focused FS for Landfill OU	Zielinski, Tamara California Integrated Waste Management Board	596
15 Nov 93	CRWQCB Letter to CDTSC on Focused FS, Draft Final Landfill OU	Williams, Camilla California Regional Water Quality Control Board	597
30 Nov 93	Attorney Letter to CDTSC on Focused FS for Landfill OU	Yim, Randall Attorney at Law	601
Dec 93	Fact Sheet, "Proposed Plan for Environmental Cleanup at... Landfill OU Sites"	AFCEE	604
01 Dec 93	EPA Letter to AFCEE Providing Comments on Preliminary Final Environmental Baseline Survey	Swarthout, Brian EPA Region IX	606
06 Dec 93	CDTSC Letter to Base Providing Comments on the Background Inorganics Soils Report	Strong, Kent California Department of Toxic Substances Control	609
08 Dec 93	CDTSC Letter to Base Commenting on Draft Final Focused FS Report, OU-4	Strong, Kent California Department of Toxic Substances Control	610

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08 Dec 93	CRWQCB Letter to Base Providing Comments on the Background Inorganic Soils Report	Williams, Camilla California Regional Water Quality Control Board	611
08 Dec 93	Base Letter to Contractor Concerning Concerning Revision to Draft Final Landfill Focused FS Report	Smith, Charles H AFBCA/OL-D	613
28 Dec 93	CDTSC Letter to Base Transmitting Comments on Draft Final Proposed Plan, OU-4	Strong, Kent California Department of Toxic Substances Control	616
11 Feb 94	Draft Record of Decision, OU-4	IT Corp.	622
15 Feb 94	Transcript of 15 Feb 94 Public Hearing	Nicol, Janet H Peters Shorthand Reporting Corp.	623
16 Mar 94	Draft Comprehensive Baseline Risk Assessment, Vol I of III	IT Corp.	626
16 Mar 94	Draft Comprehensive Baseline Risk Assessment, Vol II of III, Appendices A-F	IT Corp.	627
16 Mar 94	Draft Comprehensive Baseline Risk Assessment, Vol III of III, Appendices G-I	IT Corp.	628
23 Mar 94	CRWQCB Letter to Base Concerning No Further Action Sites, and Additional Field Investigation Dispute	Williams, Camilla California Regional Water Quality Control Board	629
22 Apr 94	RI, Draft Additional Field Investigation Report, OU-2 and OU-3, Vol I of VI, Text and Appendices A-B	IT Corp.	632

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22 Apr 94	RI, Draft Additional Field Investigation Report, OU-2 and OU-3, Vol II of VI, Appendix C	IT Corp.	633
22 Apr 94	RI, Draft Additional Field Investigation Report, OU-2 and OU-3, Vol III of VI, Appendices D-F	IT Corp.	634
22 Apr 94	RI, Draft Additional Field Investigation Report, OU-2 and OU-3, Vol IV of VI, Appendices G-L	IT Corp.	635
22 Apr 94	RI, Draft Additional Field Investigation Report, OU-2 and OU-3, Vol V of VI, Appendix M	IT Corp.	636
22 Apr 94	RI, Draft Additional Field Investigation Report, OU-2 and OU-3, Vol VI of VI, Appendix M (Cont'd)	IT Corp.	637
May 94	Additional Field Investigation, Soil Management Report	IT Corp.	639
Jun 94	Interim Soil Management Report, UST, Vol I of III	IT Corp.	661
Jun 94	Interim Soil Management Report, UST, Vol II of III	IT Corp.	662
Jun 94	Interim Soil Management Report, UST, Vol III of III	IT Corp.	663
23 Jun 94	CRWQCB Letter to CDTSC Providing Comments on Draft Additional Field Investigation Report, OU-2 and OU-3	Taylor, James D California Regional Water Quality Control Board	671
24 Jun 94	CDTSC Letter to Base Providing Comments on Draft RI Additional Field Investigation Report, OU-2 and OU-3	Strong, Kent California Department of Toxic Substances Control	672

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24 Jun 94	EPA Letter to Base Providing Comments on Draft RI Additional Field Investigation Report, OU-2 and OU-3	Lowe, Debbie EPA Region IX	673
Dec 90	SOW, Quarterly Monitoring Program	HSD/YAQE	677
13 Jul 89	Phase II Stage 2, SOW, Confirmation/Quantification	USAF OEHL/TSS	678
10 Aug 82	Base News Release, "Completion of Phase I Records Search"	Fagan, Clarence L 323 FTW/PA	687
17 Aug 84	Minutes of 6 Aug 84 TWG Meeting	Curran, James P, Capt USAF Hosp/SGPB	689
15 Jan 86	CDHS Letter to Base on Review of Phase II, Stage 1 Draft Report	Karoly, B T California Department of Health Services	691
Sep 86	Newspaper Article, "Mather Wants to Explain but no One Shows Up"	Sacramento Union	692
11 Sep 86	Newspaper Article, "Mather to Discuss Water Contamination"	Sacramento Bee	693
12 Sep 86	Newspaper Article, "IRP Meeting"	Wing Tips	694
12 Jul 94	Request for FFA Extension to Draft Landfill OU ROD	Strong, Kent California Department of Toxic Substances Control	696
10 Aug 94	Review of Draft Landfill OU Sites Superfund ROD Dated 23 May 94	Zielinski, Tamara California Integrated Waste Management Board	699
11 Aug 94	Draft Landfill OU ROD	Taylor, James California Regional Water Quality Control Board	700

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11 Aug 94	EPA Review of Draft Landfill OU ROD, 13 May 93	Lowe, Debbie EPA Region IX	701
11 Aug 94	Draft Superfund ROD, Landfill OU Sites	Strong, Kent California Department of Toxic Substances Control	702
7 Sep 94	EPA Review of Sacramento Metropolitan Air Quality Management District Letter of 27 Jul 94 RE: Air Requirements for Landfill ROD	Lowe, Debbie EPA Region IX	703
21 Sep 94	EPA Additional Comments on ARARs for Draft Landfill ROD	Lowe, Debbie EPA Region IX	704
7 Oct 94	Consensus Statement for Extending FFA Delivery Date for Draft Final ROD for the Landfill OU	Lowe, Debbie Strong, Kent Wong, Anthony C EPA Region IX California Department of Toxic Substances Control AFBCA/OL-D	706
11 Oct 94	Consolidation of Landfills 4, 5, and 6	DeGuzman, Jorge Sacramento Metropolitan Air Quality Management District	707
29 Apr 94	Reassessment of Remedial Action Cost Estimate for Landfill 6	IT Corp.	
31 May 94	Review of Draft Landfill OU ROD Dated 14 February 94	Williams, Camilla California Regional Water Quality Control Board	
21 Jun 94	Reassessment of Remedial Action Costs for Landfill Site 6	Strong, Kent California Department of Toxic Substances Control	

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12 Sept 94	US EPA Letter Concerning ARARs for the Draft Landfill OU ROD	Lowe, Debbie US EPA Region IX	
17 Oct 94	Comments on Draft Landfill OU ROD	McChesney, Frances California Regional Water Quality Control Board	
08 Nov 94	Notice to Extend Delievery Date of the Draft Final Landfill OU ROD	Wong, Tony AFBCA/OL-D	
14 Nov 94	BACT for Landfill Sites 2 and 3	DeGuzman, Jorge Sacramento Metropolitan Air Quality Management District	
12 Dec 94	Superfund Record of Decision, Draft Final, Landfill OU Sites	US Air Force	